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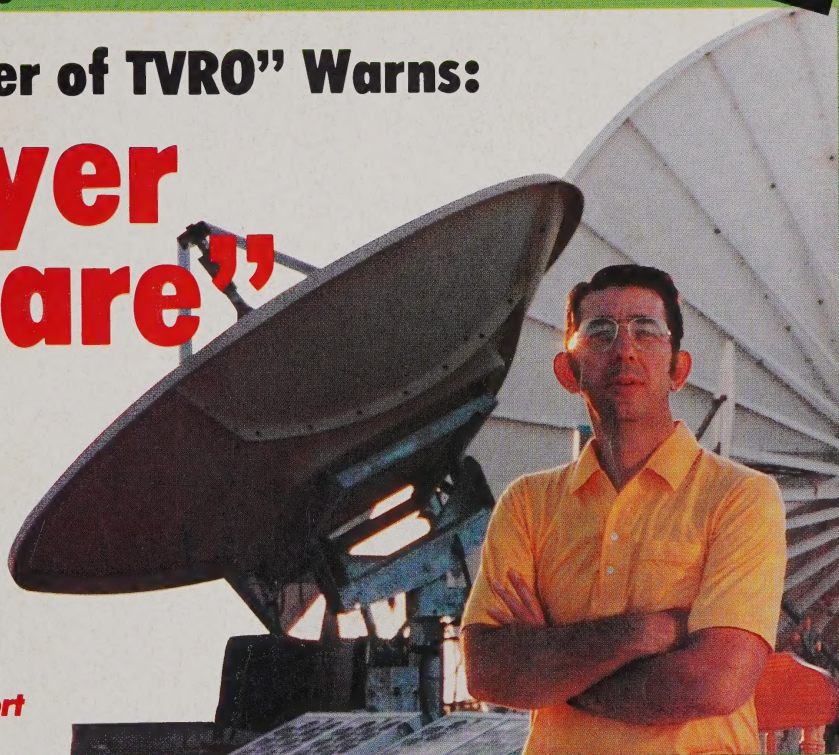
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Bob Cooper Report*



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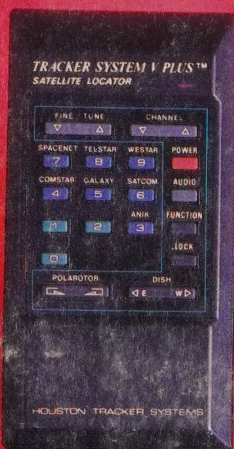


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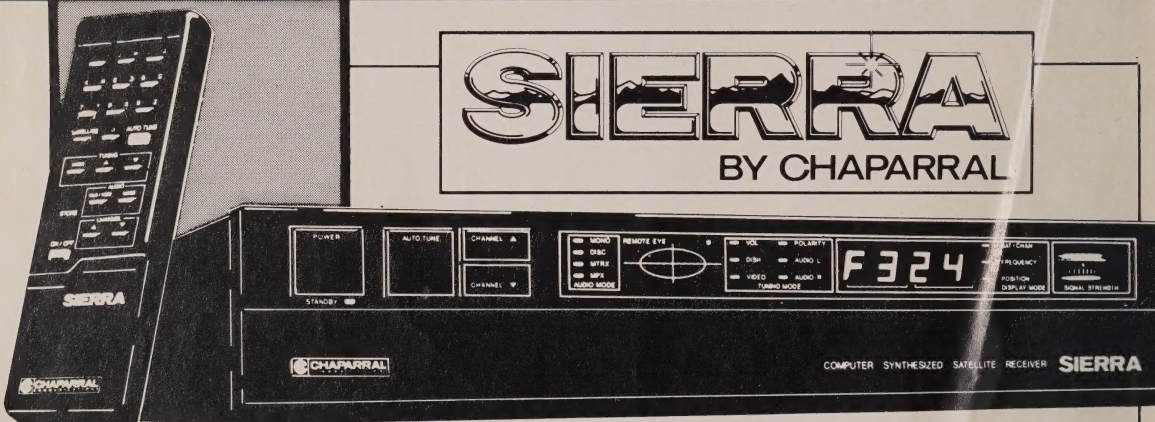
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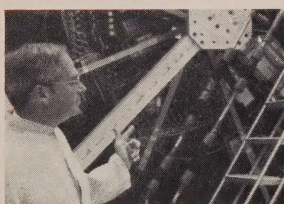


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Home Satellite TV

IS THE SKY FALLING?

On January 15th, HBO (and its step-sister, Cinemax) began full-time scrambling. The event was ushered in with the greatest possible hoopla including coverage on all major news networks.

The impact on the home satellite field was immediate. Dealers reported a sales slump, manufacturers began apprehensively eyeing large inventories, and some writers even started putting out obituaries for the field. Two out of roughly 130 channels had scrambled and some began running around doing remarkably good imitations of Chicken Little.

Nobody bothered to ask who watches HBO or Cinemax anymore. (All the people I talk to rent videos for their VCRs when they want to see movies.) People buy satellite receivers for sports, and these are going on uninterrupted (see the story in this issue by Larry Stewart). People buy satellite receivers for specialized entertainment on the other channels and these are still viewable as well.

Of course, it could be argued that I'm begging the issue. If HBO scrambles, can the others be far behind?

Yes and no. Some soon, others never. The point is that the future will undoubtedly hold some scrambled and some clear channels. The question is, do you really want to see what's on the scrambled ones? If you do, you'll need a descrambler whether you watch cable or have a home system.

Scrambling should not be seen as the end of home satellite viewing. In fact, with Ku band opening up (see the stories in this issue) as well as the possibility of other programmers now aiming their broadcasting directly at the satellite home viewer, this may just be the beginning!

Bob Wolenik
Editor

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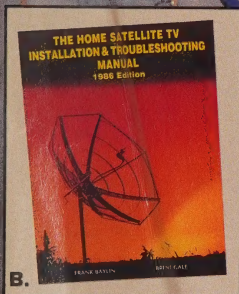
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The FCC Steps In

... And Brings Some Sense To Local Zoning Laws

Because many cities have made it difficult to install functional satellite TV reception systems, the FCC has had to step in and bring some sense of reality to the twilight zone of municipal regulation. This is good news but exactly what is it that the FCC has done for us? Let us examine the progress of the FCC action. On April 1, 1985, the FCC released a Notice of Proposed Rulemaking which would preempt state and local regulation of satellite earth stations. Here is the proposed rule:

State and local zoning or other regulations that discriminate against satellite receive-only antennas in favor of other communications facilities are preempted unless they have a direct and tangible relationship to reasonable, valid, demonstrable and clearly articulated health, safety or aesthetic objectives and constitute the least restrictive method available to accomplish such objectives.

A lengthy period of comment and study followed this proposal while the satellite industry waited impatiently for a ruling which could remove one of the major barriers to satellite sales in incorporated areas—restrictive zoning ordinances. On January 14, 1986, the FCC issued a press release announcing limited preemption of local zoning and other regulation of satellite earth stations. At the time of this writing, the FCC has not yet completed the drafting of the final rule. By the time you read this, the ruling may have been promul-

gated, so you may wish to compare the final draft with the Proposed Rule and the News Release set forth here.

The January 14, 1986 FCC news release states that state and local and other regulations which differentiate between satellite receive-only antennas and other types of antenna facilities are preempted unless such regulations:

- have a reasonable and clearly defined health, safety or aesthetic objective; and,

- do not operate to impose unreasonable limitations on, or prevent, reception of satellite-delivered signals by receive-only antennas, or to impose costs on the users of such antennas that are excessive in light of the purchase and installation cost of equipment.

As you can see from a comparison of the proposed rule of 1985 with the news release of 1986, the press release does not indicate whether a local ordinance must constitute the *least restrictive* method available to carry out its objectives, which is disturbing news. The "least restrictive" language is conspicuous by its absence from the FCC news release, in light of its presence in the Notice of Proposed Rulemaking which formed the basis of the new rule. The FCC has apparently replaced a clear and concise guideline with a vague balancing test. Local governments will apparently be allowed to balance the cost of your system against the cost of compliance with the aesthetic requirements of the local ordinance.

What does this mean to you? Does it mean that your village can require you to screen your dish from public view if you have a top-of-the-line system but not if you have a low-end or do-it-yourself system? It appears that only time and litigation will tell. Unless, of course the FCC returns the original language to the final draft of the rule. We hope for a clearer statement from the FCC on this point.

Even with this potential flaw, the new rule should be helpful. Many restrictive ordinances will now be amended to comply with this new mandate. It is not enough that the ordinance have an objective of promoting health, safety or aesthetics. As long as the ordinance discriminates against or distinguishes satellite antennas from other types of antennas, the ordinance must also avoid imposing unreasonable restrictions on reception of satellite signals. It appears that communities which have never allowed rooftop antennas may prevent the installation of satellite antennas as long as it is not the dish alone that is excluded.

The new rule is already working. Consider my village. Our ordinance requires a Special Use Permit for a dish having a diameter greater than four feet. The permit requires a non-refundable \$100 application fee, application, 12 copies of the plot of survey with location depicted, and a public hearing before the Village Planning Commission.

In my case, the entire town of 10,000 was invited, not only by a published notice in the local paper, but also by letter. At my home a letter was addressed to me, inviting me to comment on my own application. The next day an identical letter arrived, addressed to my wife. All of my neighbors received such letters. These letters were sent by the same Village Planning Commission that approved an international business center and hotel, complete with swimming pool, 20 foot satellite dish and a very active helicopter landing pad less than a mile from my house, without any written notice to supplement publication.

My first session before the Planning Commission lasted three hours, consisting primarily of my technical explanation.

Continued on page 78

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"BUYER

BY BOB COOPER, JR.

What You Should Know Before Buying A Home Satellite TV System

Home "TVRO" (TV Receive Only) just happened. And that is unusual. Home radio also just happened; way back some 65 years or so ago. A fellow playing with technology in the "teens" hooked his hand crank Victrola to his ham radio transmitter and started transmitting phonograph records. Other ham radio operators with crystal sets heard the transmissions and soon the first ham was playing special records "upon request". Shortly after, he was maintaining a "schedule" and before he knew what happened, he was a "broadcasting station".

Home television didn't just happen; it took more than ten years from the technical proving of television broadcasting to the first real commercial telecasts matched by the commercial availability of TV receivers in the Macy's storefront window. In those ten years, a slow, lethargic federal government ground through hearing after hearing, and issued written statement after written statement to create the "legal framework" for television broadcasting.

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BEWARE"

Buyer Beware from page 11

Home cable was much like the first home radio; an "amateur" (radio operator) found out he could "share" his massive television antenna with some neighbors after he built some special circuits to allow a "splitting" of the received signal. This happened in Astoria, Oregon back in 1949. From the first sharing of a "master antenna" on Thanksgiving Day in 1949 to the present generation of cable, much has changed.

Home dish reception started because an individual (by happenstance, another amateur radio operator; me.) refused to believe that private, backyard satellite reception was "beyond the reach" of an individual. In those "ancient days", 1975 to be exact, the only dish systems around were 29 feet in size or larger and owned by (larger) cable television systems. They cost upwards of \$125,000 each and when all of this started, there was only one channel or program service available. HBO was that channel.

History is boring so suffice to say that between 1975 and 1985 the size of dishes plummeted downward to the four foot region, the price dropped just as dramatically from \$125,000 to under \$1,000 and the number of channels grew from "only HBO" to "HBO plus more than 140 others".

Please go back and reread the last paragraph again. Understanding what it says will be the key to appreciating what is to follow.

By 1985 TVRO had virtually everything going for it:

- 1) (Relatively) low price,
- 2) More channels than anyone could possibly keep accurate account of,
- 3) A virtual total lack of regulation or rules or law to discourage its continued growth.

And then the troubles began.

From those first HBO telecasts starting in September (30) of 1975, until 1985, there had only been passing objection to the presence of TVRO. Everyone "knew" that TVRO system owners were watching as many as 140 channels of programming, but very few people objected very strenuously to the fact that many of those program channels were "privately owned" by firms (such as HBO) who existed as business operations only because they could "sell" or "rent" use of their satellite delivered programming services. In effect, HBO and others were attempting to distribute their programming services nationwide using a private microwave network (i.e. the satellite system) and people who did not pay anything for the use of this service were "routinely tuning in" the HBO transmissions as if they were paying customers for the service. In 1985, as the home TVRO industry laid claim to having passed the 1,000,000 home-system mark, HBO finally sat up and said "STOP".

SOME NUMBERS

HBO reaches more than 14,000,000 US homes via cable TV. These homes are connected to HBO via satellite and each of the "HBO Cable Affiliates" have their own satellite dish to receive the HBO programs. These homes typically pay just under \$10 per month to their local cable firms for the right to tune-in the HBO programming. From that \$10 collected by the cable affiliate, HBO normally receives \$4 or 50%; whichever amounts to a greater number.

The TVRO universe is something greater than 1,400,000 homes by most estimates. Therefore, for every home with a TVRO, there are 10 homes with cable with the HBO service available. The 14,000,000 homes pay for HBO each month. The 1,400,000 homes do not. That's why HBO claims they said "STOP".

On the surface, if HBO was "losing" revenue from 1,400,000 homes each month, the equivalent of say 10% of the revenue they are collecting from cable, that would seem like a severe financial drain. The truth is that until 1985 or so, HBO lost virtually NO money at all because of TVRO. How can that be?

Until quite recently, TVRO sales went into homes where TVRO was the only choice for quality television. Farmers, remote families, fishing camps and other locations where broadcast TV was poor (or non-existent), and where cable had not yet

reached were the primary buyers of TVRO. During 1985, that had changed however. As prices for TVROs came down, and as the number of satellite program channels increased, more and more suburban and urban homes became TVRO equipped. And with increasing frequency, these systems were showing up in backyards where cable TV service was available. From the cable operator's point of view, this was not good; he was beginning to lose customers who found it more attractive to spend \$3,000 for a TVRO to get 140 channels than to keep on paying \$30 a month to receive 30 channels.

So until 1985 or so, those people with TVROs watching HBO were not affecting HBO's revenue stream. As TVRO moved into suburban and urban marketing areas, HBO began to see some reduced revenues because people who previously subscribed to cable to get HBO (and paid for it) were now disconnecting from cable and watching HBO "free" from the satellite direct. And that, once again, is when HBO finally said "STOP".

The cable companies in thousands of American communities, also noticed this TVRO phenomenon. For a slightly different reason. When HBO loses a cable subscriber because that cable subscriber purchases a TVRO, HBO typically sees its revenue drop by between \$4 and \$5 per month. But the cable company loses revenues for all of the subscriber's subscription income; closer to \$30 per month on a national average. And more important to the cable company, the loss of a subscriber is also a loss of a part of the cable firm's asset base. Here's why.

Cable companies can be very profitable businesses. A typical cable system requires between 40 and 60 months to pay off its original capital or cash dollar investment (paying its operating expenses along the way). Once that cash investment is paid off, the typical cable company can retain 65 cents out of every revenue dollar. That equates in some accounting systems to a 65% profit on sales. And this makes cable, once the system is paid for, a very high return business enterprise.

Owning a cable company in this position is a good business investment. Cable companies routinely "sell" in the marketplace. There are many ways to determine the "value" of a cable TV system and one of the most common techniques is to simply multiply the number of subscribers by \$1,000. That works because if you go through all of the depreciation accounting, loan discounting and operating schedules, you eventually come to a point where you see that each individual cable subscriber contributes something per month to the "cash flow" or proceeds of the system. It works out that in a nominal 60 month period of time, each cable subscriber will (on the average) put \$1,000 into the "cash flow" of the cable system. So for a five-year return on investment, the cable system becomes valued at \$1,000 per cable subscriber.

Out of this world of "high finance" comes the realization by the cable system operator that each time he waves goodbye to a cable subscriber who has chosen TVRO over cable, he is kissing off \$1,000. That hurts. And in some mid-western towns where dozens or hundreds of local cable subscribers were abandoning their "wire-fix" for a "satellite fix", it all came down during 1985. The cable system operators got mad and they, too, joined the chorus with HBO shouting "STOP".

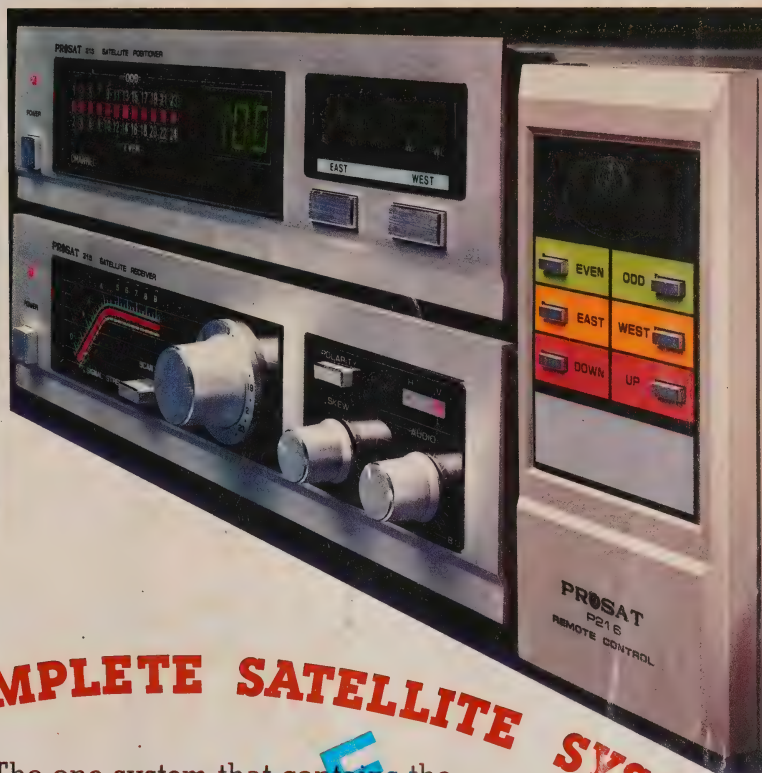
The cable camp, potentially far better funded and certainly better organized than the TVRO side, took stock of its strengths:

- 1) **Numbers.** There were nearly 40 cable homes for each TVRO home. The cable people had TVRO outnumbered.
- 2) **Dollars.** The cable industry takes in and therefore outpends TVRO by a wide margin. In any future "battle" with TVRO, cable would have far greater resources than TVRO.
- 3) **Influence.** If legislated solutions to the battle were possible, cable's political clout was significantly stronger than TVRO's. Cable had spent more than three decades nurturing relationships in Congress and at the FCC. Cable could call politicians for "favors" while TVRO could not.
- 4) **Programming.** This was the "ace"; TVRO growth had been fueled by its "free access" to programming on satellite. And guess who owned that programming; cable of course.

Cable could, and as it would turn out would, simply cut off

Continued on page 14

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Buyer Beware from page 12

the flow of *free programming* to TVRO. Here is what that is all about.

CONTROLLING DISTRIBUTION

There have always been two gnawing concerns concerning TVRO "access" to satellite delivered programming. Those concerns cropped up early in the TVRO game.

First is the question of legal viewing rights. To most people not schooled in the finer points of communication law, anything that is sent through the air (i.e. broadcast or telecast) is available to anyone else who installs the appropriate receiving equipment. There is a long and rich series of legal precedents in the United States which seems to sanction that point of view. Unfortunately, this is not (and never has been) altogether true.

Every radio or television signal is transmitted; as in being sent through the air. But only certain categories of transmissions are in fact "broadcast". One of the dictionary definitions of "broadcast" tells you that if a farmer takes a handful of corn seed and sweeps his hand distributing the corn seed willy-nilly over the ground, he is "broadcasting" the seed. The seeds land *where they land*. The analogy is appropriate.

A radio or television signal "broadcast" is released from the transmitter in a manner that encourages widespread use of the transmission by anyone equipped to receive that broadcast. However, not every radio or television signal transmitted into the air is intended as a "broadcast" signal. Some transmissions have always been deemed "private" and their use has always been restricted by federal rule and regulation. This distinction is found in our national communications law dating back to the 1920s.

And since 1934, there have been specific communication law rules regarding the "interception" and "use" of such private (non-broadcast) transmissions. For example, *Section 605* of the Communications Act of 1934 quite clearly states that if you (or anyone) should encounter such a private transmission that you are prohibited by law from (1) divulging (to a third party) the contents of such a transmission, or (2) profiting from any information you "intercepted" from that transmission. Now, when this law was written the concerns included a fear that employees of the nation's telephone and telegraph systems might "overhear" or "overread" some private, business communication and engage in an act of "stealing information" in the process. Let's say that a message so intercepted contained financial information which would be public knowledge on Monday morning. *But on Friday afternoon*, anyone who knew this information "in advance" might be in a position to trade in a stock which would benefit from that information being public on Monday. In other words, knowing something important in advance would give such a person a considerable financial advantage.

The law, *Section 605*, worried that intermediate third parties, people involved in the transmission of such messages but not related to the sender nor the intended recipient, might mis-use information belonging to someone else. This law, perhaps for the first time, assigned a "value" to the privacy of information in the United States. In a sense, it was a form of "electronic copyright".

This law, written and adopted in 1934, stayed on the books for a very long time. Forty years to be exact, with but minor addendums. During that 40 year span, the entire world of communications grew a million-fold. Satellite TV transmission, for one thing, came along.

The 1934 "act" quite properly dictated that any non-public broadcast was "protected" by *Section 605*. Therefore, if a transmission was "private", it was automatically under the shield of *Section 605*. Satellite television was (by FCC definition) not broadcast (television) and *it therefore was private*. And so *Section 605* applied.

Many argued that the act of erecting a satellite antenna system and watching satellite transmissions was not an act of "profiting" from such a private transmission. Others argued that as long as one did not "share" his satellite reception with unrelated family members, there was no act of "divulging" of the private transmis-



Ku band is coming - Tiny dishes and price tumbles by 1988.

sion. *Still others argued* that if you sit and view a program, the act of being a viewer is a form of "profiting". If you learn something, you have profited. If you laugh, you have profited. Even crying would be to profit. As you can see, as long as *Section 605* was with us, there was some confusion as to just how "legal" TVRO might be. The problem was that the 1934 Communications Act was written to protect against one type of offense and those who wanted TVRO to "STOP" were trying to make it apply to an imagined offense of an entirely different nature.

Well, the time had come to address *Section 605*. And with some clever and sleight of hand political maneuvering, the TVRO trade association (SPACE) managed to push through Congress a revision of that act in the fall of 1984. This (new) act clearly stated that you could install a TVRO and watch programs on a private (non-commercial) basis. But there was some asterisks in the new act as well, as we shall see.

Having resolved the "legal right to view" question, a cloud raised by a forty year old law, we are brought to the second question of access; program ownership rights. Once again, there is that fine line between a "transmission" and a "broadcast"; or, the signal being *sent*, and the information *contained on or in* that signal.

The 1984 revision of *Section 605* (appropriately, *Section 705*) addresses the right to *receive* a transmission. It does not address a right, real or imagined, to *extract information* from the transmission. What is that all about?

A signal transmitted or even broadcast is not identical to a program per se. The transmission itself is a conveyor system; like a public bus or car. The passenger in that bus or car is the "thing" being transported. The same analogy holds with the transmission system. The signal sent through the air is one entity. The information (pictures and sounds) carried by that signal are quite another entity.

And as is often the case in satellite transmissions, the person or company owning the transmission equipment also does not own the program or content being carried by the transmission. You can, for example, have "permission" to *tune in* a transmission but lack permission to *view or listen* to the program "content".

Let's take an HBO schedule as an example.

- 12:00— "Metalstorm" The Destruction of Jared-Syn"
- 1:00— Everly Brothers Reunion Concert
- 2:30— Crackers
- 4:00— Fraggie Rock
- 4:30— BMX Bandits
- 6:00— Evil Under The Sun
- 8:00— 2010: Space Odyssey Two

In an illustrative 10-hour period, barely 1% of a 31 day month, we have seven separate programs including five movies. Of the two remaining features one (*Fraggle Rock*) is produced by HBO and the seventh (*Everly Brothers Concert*) is co-produced by HBO. Program rights; who owns them and what permission does HBO have to resell those rights?

Program "rights", or the legal permission required to use various features in specified ways, are extremely complicated. In theory, every movie or feature or special ever produced could have its own individual "rights schedule." An example:

"Metalstorm" was "rented" to HBO for display via the HBO network to private homes, hotels and motels. But, only where those homes, hotels or motels were connected to HBO through an approved HBO affiliate. In other words, *only through HBO cable systems*. The movie's owners reserved something called "DBS Rights", and they reserved "Foreign Rights" and they reserved "Broadcast TV Rights" for a later sale to another party. So what does that mean?

HBO paid a certain fee (perhaps \$.05 per subscriber home) to show *Metalstorm*. The movie rights' owners collected 14,000,000 x \$.05 or \$700,000 for this specified showing. HBO agreed in their contract NOT to show *Metalstorm* to any of the following:

- 1) Any motels or hotels which were not connected to HBO through HBO cable affiliates;
- 2) Any private homes not connected to HBO through HBO cable affiliates;
- 3) Any location outside of the USA;

In this way, the owners of *Metalstorm* retained for future sale the showing of the film to these "additional markets" which in theory had not previously been exposed to the film (on HBO or elsewhere).

As a practical matter, this film *was seen* inside of thousands of motels and hotels with their own satellite dishes, was seen in hundreds of thousands of cable connected homes in Canada, Mexico, and throughout the Caribbean (in just Santo Domingo, the Dominican Republic alone more than 50,000 cable connected homes had access to this movie) and WAS seen in potentially more than a million homes equipped with private dishes inside of the USA.

In this scenario, HBO, Showtime, Cinemax and The Movie Channel are nothing more glamorous than movie distributors. They package films and deliver these films and other features to "electronic movie houses" called cable (TV) systems. While these movie distributors have these films in their shops, they are responsible for their safe-keeping. That means they are required, by written contract, to insure that the movies are only seen in those locations specified by contract. Santo Domingo (the DR) is not such a location. And the movie owners are aware of these "violations" of contract and have been aware of these violations for many years. And as you might suspect, these movie rights owners have been growing more and more vocal in their demands that such unauthorized display of their features "STOP".

There is an element of business missing here, from the perspective of the movie rights owners. That is "verification". HBO, when it sits down at the negotiating table with a movie rights owner, has to guarantee with some degree of accuracy how many locations can potentially view the movie *Metalstorm*. HBO records indicate they have 14,373,022 "homes" connected to their service. "Homes" also includes motel rooms, and when equipped with a TV set connected to an approved HBO affiliate system, constitutes a "home" for this counting purpose. The hard price negotiation over, the contract is filled out. The owners of the rights to *Metalstorm* fill

Continued on page 17

Original Videocipher - The format destroyed the video leaving no hint of a picture. Current HBO system has less complex video scrambling.



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in the blanks: "HBO shall have the right to distribute Metalstorm to 14,373,022 'homes' ". And so the contract is complete.

But what about those 50,000 cable TV connected homes in Santo Domingo?

They are not included in the 14,373,022 tabulated.

But "everyone knows about these homes"; shouldn't the rights owners be compensated for these homes as well? What chance will the rights owners have to rent "Metalstorm" to a theater in Santo Domingo AFTER the movie shows up on 50,000 TV dials there? Won't this display on cable in Santo Domingo? Shouldn't the owners of the movie be compensated for this loss of market???

The movie rights owners have always been very cautious about obtaining verification of "the gate"; they want proof that when a theater owner/cable affiliate says he showed the film to 13,423 homes than an extra 1,000 people did not sneak into the theater or onto the cable lines. Going out to 6,000 HBO affiliates and counting every home they are connected to is not practical. They virtually must accept the HBO records in this matter. But in exchange for accepting these records, they can also make a demand.

"We want your signal scrambled; we want to see that you are making an effort to deny service to Santo Domingo and any place else where your satellite transmission can be received without your authority."

Scrambling becomes a new form of "gate verification"; it provides a computer printout of authorized customers and their locations which HBO (et al) can hand to an inquisitive movie rights owner with a "Here it is; every location where Metalstorm will be seen during January!"

But there is at least one untidy end to this whole rights business. Those homes in America who are indirectly plugged into the satellite TV distribution system bypassing the local cable company. There are three letters in our jargon which describe such homes; DBS.

DBS is shorthand for "Direct Broadcast Satellite". Remember that satellite TV is not considered "broadcasting" at all; it is a form of "private microwave" authorized for the private use of firms such as HBO. HBO does not operate "in the public interest" like ABC, CBS and NBC. HBO has no "broadcasting licenses" because HBO is not a broadcaster at all. It is basically a film distributor; nothing more, nothing less.

DBS, by official description, is a new form of satellite to home television BROADCAST service. To engage in DBS, a firm must have the appropriate license from the Federal Communications Commission (FCC). A few such licenses/permits have been granted. HBO is not the holder of such a permit.

By further official description, DBS will operate in a specified frequency range or band (Ku band) using special frequencies or channels set aside by the FCC for this purpose. DBS licenses will function much like regular TV stations with a few modifications that recognize their wide, national reach.

The movie rights owners recognize DBS as a new marketplace; a new "venue" where they can (re) sell Metalstorm to yet another new audience. There is no DBS yet; there may never be a real DBS if the current technology trends continue. We'll see why shortly.

And, DBS, again by official description, involves a specific service designed solely for home reception.

Well, we have elements of DBS already. We have:

1) Perhaps 1,500,000 (US) homes receiving "direct" satellite TV;

2) We have some (limited) programming on those 140+ channels created specifically for these (1,500,000) homes.

- Alas, we do NOT have:

1) Official sanction for this sort of reception;

2) Acceptance that these homes are a part of the "business scheme" for the majority of the programmers presently utilizing satellites for signal distribution.

And so we have a quandry: a giant quicksand trap into which 1,500,000 "lucky" home viewers have fallen because they could

not resist the overwhelming temptation of all of that "free television". Who is responsible for this mess???

FCC HANDS OFF

Earlier, we pointed out that "Home TVRO just happened". That is not altogether true but it is accurate as most everything else you hear these days. Here is what really happened.

Once a few hardy pioneers like Taylor Howard, Robert Coleman, Oliver Swan and this writer had worked out the bugs in home systems (I built a six foot dish in 1978 and proved that it worked; and here you thought small dish systems were a recent development!), a handful of us sat down to map out a strategy to make TVRO a household word. I can write about it now with some authority because I was a participant. Some will suggest "the" participant.

First of all, in 1978, we knew what we were doing. SPACE Chairman Taylor Howard likes to pretend that we just sort of stumbled into the TVRO world. Not true (sorry Taylor).

A "game plan" was drawn in 1978. It clearly listed all of the obstacles to creating a successful TVRO industry (with perhaps a dozen terminals in private hands and only two people who knew how to build the equipment, at that time, it was easy to keep things under wraps). There were several significant roadblocks to the development of TVRO:

1) The FCC required, at the time, that each TVRO have a federal license. To get such a license, you needed to install that dish in an FCC prescribed manner. That included:

A) No dishes smaller than 15 feet in size (!);

B) A complete disclosure of the financial ability of the person installing the dish (i.e. a complete, accurate, financial statement);

C) A complete and detailed engineering statement/application describing the full dish system.

Bottom line? About four months time "waiting in line" to have the license application processed, and between \$1,500 and \$2,500 in "license application fees" and charges. Obviously this was a serious impediment to the rapid development of TVRO.

I "volunteered" to get these rules changed.

2) The least expensive equipment, packaged to make a TVRO, came in at around \$11,000. And that was for a type of receiver that only "tuned in" a single satellite channel. The cost obviously had to come down. Taylor Howard and Robert Coleman went to work on that problem.

3) The volume of TVRO equipment production was exceedingly low. Of course the only "buyers" were cable systems but even at that, there was a waiting list of several months' time attached to buying a TVRO. I went to see some people at Microwave Associates (now M/A-Com) about that one.

And the "tough two" roadblocks.

4) Section 605 of the communications act said we could not tune in private satellite transmissions. This law was plainly antiquated but how do you get it changed? We brought a young Washington attorney into the "council" (Richard L. Brown) and he suggested we simply "ignore" that problem as if it did not exist. We took his advice.

5) The programmers showed no interest in allowing their services to be "used" (as in "watched" or "enjoyed") by private TVROs. After a dozen virtually fruitless meetings with the programmers, I simply gave up on that one once again following Rick Brown's advice we simply "ignored the problem."

Brown did create the now famous "Boy Scout" tactic which TVRO would follow for the next five years. As an industry, we kept offering to pay the programmers and we floated a dozen different plans to pay them. Of course each time we offered such a plan, they rejected the offer. But it made us look pretty good since we had continually offered to pay and they had continually refused to accept our money. I still have some checks returned from HBO and others, back in 1979 and 80, where they simply refused to take our money!

So the TVRO industry was launched (I won't bore you with my recollection of the details) following a written plan. We, those half

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dozen to ten that would eventually play key roles, knew exactly what we were trying to do. We also foresaw the opposition of cable down the road and we clearly expected a battle with cable before it was all over.

There was one bitter disappointment to me in all of this; it happened this way.

As part of the plan to create a TVRO business, I had written a lengthy article for *TV GUIDE Magazine* in mid '78. When it appeared in print, I was flooded with letters from people who basically said "I want a TV dish system". There were more than 10,000 pieces of mail in two weeks. I think my mailman filed for permanent back disability after the episode.

I bundled up the letters and took them to a trio of people at Microwave Associates (i.e. now M/A-Com). I had done some consulting work for MA prior to TVRO and had gotten to know their then-top-management people very well. Inside of MA was a group that was designing commercial satellite TV receivers. Heading up the group with MA was a top flight engineer named Fred Collins. I wanted Collins to start over, from scratch, and design a "low cost satellite TV receiver" for home use. MA's top management liked the idea and Collins had the receiver running by early in 1979. Others at MA studied and researched low cost antennas, LNAs and so on. We had a target price of \$2995 for a complete system using a ten-foot dish. Remember, this was 1979 (!).

The package was about complete when there was a management shake-up at MA. Pity. Had this market shake-up not occurred, MA would have been into the market by the fall of 1979 with complete home terminals for under \$3,000 at a time when nobody else had anything at all; unless you went to the \$11,000 cable system terminals.

To kick off the industry, I created the first industry trade show or "seminar" for August of 1979. Microwave Associates was supposed to unveil their under \$3,000 system at that trade show. Looking back, had they been able to do that, they would have walked out with hard orders for perhaps 1,000 systems at a time when the total TVRO universe didn't add up to 200 systems. Pity, again.

There was a bit of subterfuge in those days. I admit it. Jack Perkins of NBC news caught me on camera during an interview done at this 1979 trade show and asked "How many people have these things (dishes)?" That was an important question since if we only numbered a handful, nobody would pay any attention to us. I exaggerated slightly with my response.

"Legally, or otherwise?" I shot back, mindful that as of mid-1979, the FCC still required that a person owning a TVRO have an FCC license. I had the ONLY such license ever granted.

"Otherwise . . ." responded Perkins.

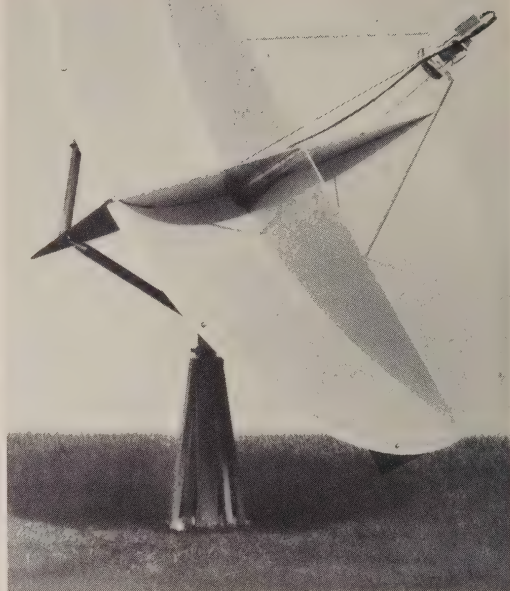
"Between two and three thousand" I quickly shot back knowing full well that 200 would have been a high side number.

That bit of deception was important. We had to look "important" by our numbers, but not overpowering. We wanted people to know there was such a thing as TVRO, but we didn't want to attract too much attention; yet.

Well, it worked. We (the TVRO industry) gained nearly eight minutes of prime TV airtime on Christmas eve in 1979 with the Perkins' report on an old Tom Snyder Saturday evening program. Perkins did his homework well and the report properly painted TVRO as "the in thing", the great new "electronic toy of the 80s" and millions of people saw this report and wished they too had such a machine in their yards. The stage was set for the launching of TVRO.

SCRAMBLING

The NBC report, perhaps quickly forgotten by many (or not seen by many more, in spite of its prime time slot. Tom Snyder was about to be canceled and his audience for the Sixty-Minute look-alike program was going fast), was not the first time we had employed "over hype" to get the attention of "the establishment". It all started in 1978, with the *TV GUIDE* article. While not dishonest, it was certainly misleading to suggest that TVRO dishes



Innovation - This Pico product tried to cancel out terrestrial interference.



Trade show extravaganzas - They include "antenna lots."

were popping up in backyards all over America. Out of that massive exposure, however, came a handful of inquiries which kept the "myth" going.

CBS News was one and a report of the Cronkite news for October 31st resulted. More thousands of letters. Major magazines such as *Popular Science* and *Mother Earth News* to mention a pair were next with extensive feature stories. And more thousands of letters.

The cable networks, meanwhile, were caught unprepared. They had a "question of policy" to deal with; "Should we 'sell' our service to home dishes?" The answer was of course "No". Make that HELL NO!!!

That did not stop several entrepreneurs from trying to package the services together for sale to home terminals. Gardner Communications (Houston) was one firm that tried this. Scientific-Atlanta was another. Gardner wanted to act like a "giant cable system in the sky", signing up home viewers who would, they said, select the services they wanted to watch and pay just for those services. There was no scrambling planned; it would have been an honor system. Gardner got lots of interest from the handful of real terminal owners but most of the program services *refused to sell to* Gardner (or anyone else). Scientific-Atlanta tried a similar approach, with a variation. S-A, then a major supplier of commercial terminals to cable, broadcast and (authorized) motels/hotels wanted the non-cable subscribers to be "tacked on" to the subscribers for the closest cable system. If you lived outside of Farmington, New Mexico, your home TVRO would simply count as an additional cable subscriber watching HBO for the Farmington system. Most of the cable program services agreed to this plan, with one significant exception; HBO. Home Box said "No thank you" and S-A disbanded their home TVRO selling unit and left the business for several years because they could not put this package together. S-A, you see, felt that if they could not work cooperatively with the cable programmers, they could not afford to sell TVROs to individuals; they didn't want to risk losing the direct cable business by angering the cable operators with an "end run".

Jack Perkins, on NBC, put his finger on it late in 1979.

Tom Snyder: "Suppose these things, these home discs, become very popular. Suppose there are millions of them, all stealing programs pirated out of the sky? Then what? What will the programmers do then?"

Jack Perkins: "Well, the programmers say that if this gets to be too popular, they will simply scramble. They will make their programs unavailable to the home viewers. But those hobbyists we met in Oklahoma City at that trade show say, 'Let them scramble, we can unscramble!'"

And through all of this stood SPACE and Richard L. Brown mouthing the party line. "*We wish to pay. We are offering to pay. But the programmers are refusing to accept our money.*"

By 1980, HBO was getting serious about scrambling. There was a scrambling system going into use. Oak Communications had it and they called it Orion. It worked, but not very well. HBO looked at Orion and decided it was not sophisticated enough for their needs. It was also not reliable enough, back in 1980. The satellite world was filled with horror stories involving scrambled sporting events which could not be descrambled, even with the Orion decoders. And when you had 10,000 paying patrons in a civic center in Jacksonville, and the decoder didn't work . . . well, you had a different kind of "fight" on your hands. One involving hundreds of unhappy, boozed up members of the audience. After a few of these incidents, the Orion system earned a very bad name.

Enter M/A-Com. The 1981 M/A-Com was apparently a different company than the 1978 Microwave Associates that screwed up the early entry into TVRO. Having just come off a several year corporate buying binge, M/A-Com was renamed and much bigger. One of the firms they had acquired in their buying spree was heavily into very high tech encryption systems. Named LinkAbit, it was a prime (perhaps "the prime") supplier of military encoding and decoding systems. If the system was good enough for the Moscow/Washington "Hot Line" . . . You get the picture.

M/A-Com said they had an encryption system good enough

for HBO. HBO took until 1983 to select the LinkAbit system but then they finally did and the first public demonstrations were to the cable industry early in 1983. The system would later be demonstrated to the European satellite industry at a Birmingham (England) trade show in early fall of 1983. A scheduled demonstration to the TVRO industry later that same fall fell through when M/A-Com decided with advice from HBO that there was no point in "showing it to the enemy".

The LinkAbit system was a victim of its own hype. The system the cable industry saw early in 1983 turned out to be far too expensive for cable system use. It was good, when it worked properly. The picture was taken completely apart (all television pictures go together a line at a time, in sequence to "paint" a full picture on the screen) and then re-arranged for transmission. As it came down from the satellite, it bore no resemblance to the original "sequence" of picture lines and thus the picture was totally unintelligible. The sound was "gone". But this cost so much to produce, and it reportedly had such a high failure rate, that what appeared to be a mature system in late 1983 was actually nothing more than a laboratory curiosity. HBO acted like the system was ready for deployment. It was not.

Another year would pass before M/A-Com could convince HBO that a "less complicated" version of LinkAbit was adequate for the task at hand. The new version, appropriately called LinkAbit II, or later Videocipher II, used the same basic technique to mess up the picture as the original *Oak Orion* system. The audio was still "gone" because of something called digital audio encoding. The differences between the "improved" Oak Orion system and the M/A-Com Videocipher II were no longer significant. But M/A-Com got the HBO contract because they had progressed so far with HBO before the changeover from the original LinkAbit system that it was going to be very uncomfortable for HBO to get back out of bed with M/A-Com.

The cable industry, meanwhile, was getting more and more nervous. With each passing month, the number of TVROs in place was growing. More importantly perhaps, the TVRO "industry" was growing bolder each month. As production capabilities for TVRO systems increased, the hardware market shifted in 1983-84 from one of equipment shortage to equipment abundance. Growth of TVRO through the fall of 1983 had been paced by the ability of the hardware suppliers to ship systems. By the fall of 1984, we were beginning to have equipment surpluses simply because "Japan, Inc." had entered the hardware marketplace. Even though the marketplace itself had doubled in sales between '83 and '84, anticipated shortages of equipment did not develop. American suppliers had peaked out at around 25,000 American built systems per month. By the fall of 1984, with the added "help" of Japanese, Korean and Taiwanese production plants, the industry was clearly *capable of* building as many as 100,000 per month.

Prices tumbled on hardware and that attracted a new breed of TVRO retailer who specialized in deeply discounted systems using small dishes. TVROs sprung up in urban and suburban shopping centers from coast to coast. With price-leader systems advertised for under \$1,000, the cable operators suddenly saw TVRO as a new threat. And TVRO advertising in newspapers and on local radio fanned the fires.

"*NEVER pay for HBO again*" the advertisement headlined: "buy our satellite system and receive over 100 channels free of charge!!!"

A mistake, of course. HBO and the cable firms saw these advertisements and reacted with indignation. All of the elements of a serious conflict were in place:

- 1) Mass merchandising retailers were now stocking TVRO systems;
 - 2) The systems were priced low enough that virtually any middle income family could afford a system;
 - 3) Retailers were offering financing and credit terms on systems;
 - 4) Radio Shack, Amway and other big promoters were entering the TVRO system field;
 - 5) Cable's "Private Programming" was being widely touted as being available "FREE".
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TVRO pioneer - Taylor Howard who helped found the field.

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Cable, as an industry, took stock of its ability to respond to this new threat and came to the only logical decision open to it; *all* of its programming services had to SCRAMBLE, fast.

BUT - Was The Scrambling System Ready?

The time is late 1984. Cable's leading programmers, lead by HBO, are now convinced that the TVRO train has to be derailed. M/A-Com, in their role as developer and would-be-supplier of a universal scrambling system for cable programming, is not ready to deliver; yet. Internal memorandums within HBO accepted that it would be early 1985 at the earliest before the cable version of the descrambler price would be available for shipment. Even that pessimistic assessment would slide by several months. Home style descramblers would follow later in 1985; they hoped.

The 'roll out plan' for scrambling evolved as follows:

- A) The seasonal nature of TVRO sale (slow in winter, better in spring, sluggish in summer and biggest in fall) was duly noted.
- B) A national effort to re-educate the American (and Canadian) population concerning the 'advantages' of owning a TVRO would be developed by a skilled marketing department (guess which one) but administered by the cable trade association, NCTA.
- C) The program would consist of as much press and media as HBO/Time, Inc. could muster (outside of their own publications, where possible) plus 'allowing' the local cable operators to pay for 'public information announcements' in local newspapers.

The effort paid off quickly; major newspapers and television groups jumped on the stories. Basically, they said *'The Skies Are Going Dark.'* HBO provided various Vice Presidents to appear on national television and to sit for interviews to substantiate the statement. Months later the prestigious New York Times would headline on January 15th *"S-DAY: Today The Satellites Scramble!"*

Two or perhaps three major facts were lost in the major media blitz engineering by cable and cable programmers:

- 1) Not all, not even a significant number of the total of all TV channels on satellite, would scramble. Ever.
- 2) Of those that would scramble, virtually all had quietly pledged to make their programming available to home TVRO viewers for a monthly fee.
- 3) And the de-facto supplier of descramblers, M/A-Com, was promising everyone who would listen in every possible forum that there would be 'adequate supplies of descramblers available in the pipeline before HBO scrambles.'

It was particularly bothersome that HBO seemed to be talking out of opposite corners of its corporate mouth. To cable and the general press, HBO was saying "Private home viewers have been watching our programming for more than six years as pirates. We simply must stop this piracy and we must protect the integrity of our product for our authorized affiliates (the cable TV systems)."

Words issued for cable and general press distribution left no hint of encouragement for the home TVRO viewers. But a series of advertisements, prepared by HBO and appearing in consumer guides for satellite TV, left the door open a crack:

"As an owner of a home satellite system, you can continue to receive HBO and Cinemax through the purchase of a consumer descrambler and a monthly subscription. . ."

While all of this was happening, the technical refinements for the Videocipher were moving ahead. There were some problems, and here is why:

- 1) Ideally, the Videocipher will allow the regular satellite TV receiver to process the satellite signal from its incoming microwave frequency to its outgoing 'baseband picture and sound.'
- 2) Unfortunately, when this process occurs, each receiver design imparts its own characteristics or 'impressions' on the recovered video and audio.
- 3) Some of the 'impressions' or as the engineers call them, distortions, upset the purity of the signal coming from the receiver.
- 4) The Videocipher decoder has a very stringent set of operating parameters. When the video it receives from the receiver does not match these parameters, it rejects the video and refuses to process (descramble) the picture.

In effect, the Videocipher unit and the receiver unit it is matched with are not compatible. There were nearly 10,000 receivers in use in HBO cable affiliate systems which had to match their characteristics with Videocipher. Receivers in cable headends typically cost two to three times as much as home receivers as a minimum, and may cost upwards of ten times as much. What percentage of the cable industry's 10,000 receivers tuned to HBO did not function with Videocipher? Would you believe more than 30%?

Cheaper receivers typically have less refined operating parameters. That means that as a generalization, less costly receivers are least apt to work with Videocipher. If upwards of 30% of the expensive cable receivers had to be modified or replaced for Videocipher, what percentage of the home receivers would have similar problems? That certainly seems like something the descrambler supplier, M/A-Com would want to know *before* it embarked on the production of Videocipher descramblers.

It was in the fall of 1984 that M/A-Com finally *admitted* there was a significant problem with 'interfacing' their Videocipher unit to the existing world of TVRO receivers. They had a glib suggestion to the TVRO dealers who heard this pronouncement:

"Consider this an opportunity to sell the home TVRO viewer a new receiver; you may not make much money selling the customer a M/A-Com descrambler but that descrambler will be your ticket to a replacement receiver sale..."

From the fall of 1984, revelation that "not all existing receivers will work with Videocipher" to the January 15th (1986) official start date for full time HBO and Cinemax scrambling, M/A-Com played a 'shell game' with everyone's receivers. First they promised a list of *all* receivers that would work, out of the box when unpacked, with M/A-Com's Videocipher. After months of delay the list was produced; it had four different receiver models on it and two of those were manufactured by M/A-Com! There were more than 60 that did not make the list. Naturally, those TVRO dealers handling the receivers on the bigger list were not pleased M/A-Com, meanwhile, with perhaps the same attitude as a famous French lady, had another glib suggestion:

"Let them buy a M/A-Com receiver to replace that old receiver that won't work with Videocipher..."

M/A-Com's 'stock' (on the stock market as well in the PR world) fell to an all time low. Dealers advocated boycotting of any M/A-Com products. Major distributors announced they would never handle any M/A-Com products again. Television programs aimed at the TVRO dealers openly urged dealers and consumers alike to *not* buy the Videocipher units.

People's 'Right' To Knowledge

With M/A-Com wounded and losing altitude rapidly, the cable industry quickly re-assessed the situation. 'Their choice' for defacto scrambling, Videocipher, was in trouble. Not only had the

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Buyer Beware from page 20

TVRO industry risen up in arms against the system and its supplier, but several 'key' cable programmers were also chaffing at the bit to bypass Videocipher. It happened this way.

The same 'lack of candor' which characterized M/A-Com's dealings with the home TVRO receiver industry was also apparent in their dealings with the cable programmers. For example, there was the case of WGN in Chicago.

This Chicago 'Super-Station' is carried to satellite by an intermediate company called 'United Video.' WGN is a passive participant in the wide national distribution of its programming; United Video is the tour guide and conveyance system. In addition to carrying WGN nationally on satellite, United Video also carries another 20+ audio services nationwide on the very same satellite transponder (channel). To transmit WGN plus 20 (+) additional signals all at one time without causing interference from one to another is no easy trick.

United Video, under considerable pressure from the cable operators, knew it had to scramble. But it also knew that the Videocipher system was unproven in a situation where one television program Plus 20 (+) additional audio channels would be transmitted. A test was arranged. For a combination of reasons (poor preparation by M/A-Com included), the tests were a failure for Videocipher. The results of the tests, with Videocipher failing, were widely distributed within the TVRO and cable arenas. And that opened the scrambling door just a crack to allow some other would-be scrambling system providers to imagine for a brief period of time that they might have a 'shot' at being involved in this marketplace.

Alas, the cable television association rallied behind M/A-Com, and actually wrote them a check for \$10,000 for some 'assistance' leading towards adoption of the Videocipher system for all of cable. After an emotion filled sixty days, Videocipher was the locked-down favorite of the cable industry.

The question of 'one descrambler system' is of course a double edged sword. An early fear was that if two or more separate scrambling technologies did develop in the marketplace, the poor consumer would be pushed into making a decision:

- 1) Select Brand 'M' and only be able to view or subscribe to those programs descrambled using brand 'M';
- 2) Select Brand 'S' and only be able to view or subscribe to those programs descrambling using brand 'S'; or,
- 3) Acquire one each of both brands to access *all* of the scrambled programs available.

Cost is a consideration. HBO has 'pushed' hard on M/A-Com to establish a national 'list price' of \$395 on the Videocipher unit. Of course other products have suggested list prices as well and that hardly stops discounting. This one would be different.

Discounting pricing is possible only because of extraordinary margins or markups between the distributor and dealer, or dealer and customer. Taking 20% off of something that has a 50% markup still leaves the retailer with a 30% gross profit. Videocipher would have a very small markup; barely 12% between the distributor and the retail dealer and then barely 8% between the retailer and his customer. There is no room for profits, let alone discounts, in that pricing structure.

So why would a dealer even handle Videocipher if he cannot make money handling the profit? Two reasons:

- 1) It is the 'only game in town,' and,
- 2) M/A-Com is encouraging the dealer to trade the consumer out of his present receiver in favor of a new (Videocipher compatible) receiver to go along with his new Videocipher unit.

Are the dealers standing in line for this *great opportunity*? Does it snow in Miami in June???

And that brings us to the 'other edge' of the sword. If we have two (or more) separate descramblers offered, each wed to some group of cable programming via satellite, the consumer is forced to either select between the 'scrambling formats' or spend twice as much for two separate descrambler boxes. It is the old 'Beta' versus 'VHS' war all over again. Or, if we have only one scrambling system, a defacto standard as it were and because of patent and

proprietary knowledge only one firm (M/A-Com) is able to offer equipment in that field, then we have at least the potential for 'price gouging.'

M/A-Com could well be guilty of price gouging. Many people believe so. For example.

1) The cable style Videocipher II unit, far more complex, three times the size, and inclusive of special 'redundant' (back up) circuits, has been selling to *cable operators* for as low as \$365. The VC2000 series of family/home descramblers, on the other hand, goes to the end user for \$395.

2) The cable version has been manufactured in relatively limited quantities, largely on stateside production lines using expensive overhead and expensive labor. The home version, which M/A-Com says they will build 200,000 of before mid 1986, is being built offshore in Puerto Rico using inexpensive labor and a tax payer subsidized production environment.

So why does one cost \$30 more than the other when the unit costing the most has the lowest costs attached to it? Would Videocipher for home use cost \$30 more than the cable version if there were four competitive manufacturers building it? Not likely. Price gouging? Possibly.

Not to be lost in all of these facts and figures is the basic new testament of TVRO. And that is:

"Satellite television offers every American, in fact every resident of North America, virtually unrestricted choice of knowledge, education, information and entertainment."

Does not the First Amendment of the Constitution *guarantee* each American equal *access to information* and also guarantee his or her right to a free flow of speech? Does not the satellite system, which some will point out was made possible by uniform application of tax payer dollars, make possible (perhaps for the first time) such uniform access to information, and, education?

I may live in Libby, Montana by choice. Or I may be forced to live there. But for whatever reason I reside in Libby, I am none the less disenfranchised from the great flow of information which is in fact the beating heart of America. Do I not have a 'right of access' to every bit of information which is so freely available to the residents of Manhattan? Does a firm such as M/A-Com or HBO have special ownership rights to that free flow of information which transcends my right of access? These are not frivolous, philosophical questions. They are the core of the debate over the ultimate 'rights of TVRO.'

RESTRICTING INFORMATION FLOW

There are several immediate results of a system which attempts to shut off the flow of information to disenfranchised America. Let's see how it happens.

1) The U.S. government has complicity in what has happened to date. First came the decision of the Federal Communications Commission in October of 1979. That decision, addressing home TVRO, said that existing FCC rules requiring federal licenses for TVRO systems were antiquated. The dialogue of that meeting, freeing up TVRO from FCC rules, plainly said the FCC realized that by removing the licensing requirement, TVRO would be operating without regulation. The FCC on October 18, 1979 promised to 'revisit TVRO soon.' That soon has yet to come. In the interim, nearly 1.5M TVROs have been sold and installed, without federal rules to prevent their installation or prescribe their use.

2) Next, by adopting legislation in October of 1984, the U.S. Congress *formally approved* ownership and use of a TVRO. While the FCC removed its regulations prohibiting TVRO, failure of the FCC to later enact 'positive regulation *allowing* TVRO' left TVRO vulnerable to potential lawsuits. The 'Satellite Viewing Rights Act' of 1984 clarified this 'right.' Unfortunately, the same act was less than clear on the ultimate relationship between TVRO viewers and TVRO programmers. What the law did say was useful; what the law failed to say has been a continued source of debate and confusion since shortly after the act was signed by President Reagan.

At issue here is the basic rights of two separate groups; the people or firms that own or control the programming, and, the citizens of America who live in towns such as Libby, Montana. Can there be an accord?



Early effort - It took 13 men in 1981 to hoist this 16 footer.



Flouting it - Piracy issue led to cable vs. TVRO animosity.



Improved technology - Doug Dehnert of USS/Maspro conducts measurements on an antenna feed system - a critical point.

The first group says, rightfully, that for each program they transmit, there are costs. Those costs must be paid by someone. And if one group of citizens (ie. cable subscribers) agree to pay their share of the costs for such programs, why shouldn't another group viewing the same programs (ie. TVRO owners) also pay their share of costs?

The second group says two things:

- A) The costs to them must be fair and reasonable, and,
- B) They should not be denied access to the information for any reason, other than their choice not to pay for the service. And that presumes a fair price to begin with.

On the surface, this is not such a difficult problem. But there are other factors affecting the equation. First is the nature of distribution. The programming in question is largely created for the cable television industry. The cable television industry supports the programs of CNN and USA Network and CBN because these programs have an appeal to the cable TV viewers. Slowly, through the years, the cable operators have grown accustomed to being a monopoly; very few towns have two or more competing cable systems. Therefore, if you are a consumer and you desire the services of CNN, USA Network and CBN, you have no choice but to go to your cable affiliate for those services.

TVRO is a direct threat to that monopoly. And cable, all of cable, sees only two alternatives to the TVRO threat:

- 1) Squash TVRO through legislative and court and economic forums, and/or
- 2) Take over the control of TVRO.

The options available to cable are many. Creating legislation to stunt TVROs growth is one; perhaps that is what *really* happened with the 'Satellite Viewing Rights Act of 1984.' We thought we gained a victory; maybe what we really gained was a heavy yoke around our neck which we are now unable to shuck.

Taking TVRO to court has been tried and for the most part it failed. A TVRO dealer, in Wichita, Kansas was successful in defending his right to sell TVRO systems within the cable franchise area of a major cable operator. Cable lost that round.

And that leaves economic forums, and, taking over control of TVRO. The two go hand in hand.

The one ingredient in TVRO which has been troublesome from the very start of home systems is the actual ownership of the programs being viewed. *SPACE*, the national trade association, argues that absent legislation designed to 'force' fair pricing of satellite programming, there is no incentive for cable programmers to price it fairly. Why would that be?

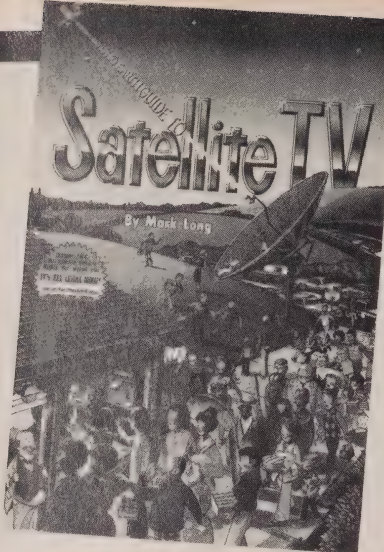
While cable programming may only make up 30 or so of the 140 plus channels available on satellite, there is no question but that those 30 channels are the most frequently watched and enjoyed satellite channels. If all 30 of those channels were to suddenly disappear from satellite dishes, no longer be available to home viewers, the attractiveness of owning a TVRO would diminish abruptly. One effect of scrambling all or a majority of those 30 channels is to 'remove those programs from home TVRO viewer screens.' Cable has the right to scramble; they have always had the 'right' and the Satellite Viewing Rights Act (1984) reaffirmed that right.

Cable also argues that because those 30 channels were created specifically for cable television viewers and are funded directly and indirectly by cable viewers and cable firms, the ultimate 'destiny' of those channels must be decided by the owners of the programming. It is a crippling argument for TVRO.

But there is that other nagging concern for the homeowner in Libby, Montana. Should their home not have access to those 30 channels as well as a home in Manhattan?

Back to cable's monopoly. Libby happens to have its own cable system. That cable system does not carry *all* of the 30 or so cable programs delivered by satellite, but it carries some. A homeowner in Libby therefore *could* avail himself or herself of some of the programming by subscribing to the cable. Or, the same home could have all 30 of those programming sources (plus another 110 or so on satellite and not affiliated with cable) by purchasing a home TVRO. The cable operator is caught in the middle.

Continued on page 25



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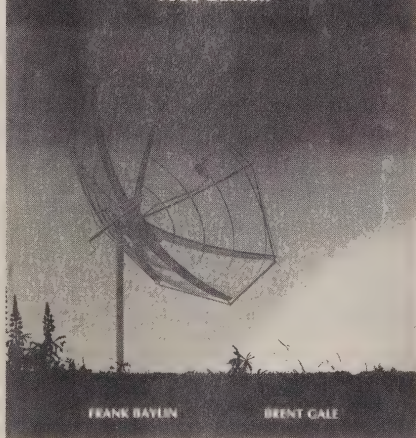
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Buyer Beware from page 23

1) If he 'allows' the homeowner to purchase a TVRO, he is giving up monthly cash flow for that home. He is also losing the 'asset value' of that home as a cable subscriber.

2) If he 'allows' the homeowner to purchase a TVRO but the homeowner is required by various distribution agreements to purchase his monthly satellite service and descrambler from the Libby cable operator, things are better for the cable operator. Now he has *some income* from the TVRO owner but not as much as he would have if he had the same home on the cable service. He has still lost the asset value of that home.

3) Or, if he can simply stonewall the homeowner, somehow keep him from buying a TVRO (forever), he will retain his cable cash flow and his asset value for the home.

Now, you are the cable operator. Which of those three choices will you elect? Collect \$1,000 and move ahead four squares if you said 'number 3.'

SPACE believes strongly that as long as it is in the best business interest of the cable operator to select number 3 here, there can be no real marketplace for descramblers and descramblers programming in TVRO. *SPACE* says legislation and only legislation forcing programmers to sell their services universally at fair pricing is the answer.

Unfortunately for TVRO's side, there is ample evidence to suggest this is a clear analysis of the actual position of cable. For example, early pricing by cable programmers to TVRO.

1) HBO announced they would sell Home Box Office service to individual home subscribers for \$12.95 per month. Or, when bundled with Cinemax, for \$19.95 per month.

2) CNN plus CNN/2 said they would sell these two channels for \$25 a year or \$2.08 per month.

3) ESPN said they would sell their services to home viewers for \$19.95 per year (\$1.66 per month).

These rates are as much as 1,000% greater than the rates cable system subscribers now pay for identical service. That's an insult. The insult becomes worse when you appreciate that the home TVRO viewer is also laying out an average of \$2,990 for his TVRO system. Many people have written tens of thousands of letters to satellite program guides and their Congressmen stating "I will not pay these exorbitant rates." In a normal mix of commerce, when somebody prices something too high and it does not sell, either the item disappears from the marketplace or someone else comes along with a similar product at a lower price. It is called competition and it usually works.

But possibly not here.

If the cable system operator is paranoid about losing subscribers to TVRO system sales, he then tells his fears to his programmers. HBO and CNN quickly tune-in to this fear and they share that fear because if HBO and CNN see an erosion in affiliate subscribers, they will also eventually see a similar loss of their own subscribers—on a one for one basis.

So the incentive, the reason to lower the prices to a rate which encourages home TVRO viewers to subscribe, is missing. *If the prices are lowered, then TVRO once again becomes an attractive commodity.* If TVRO is reasonably priced, then people disconnect from their cable system (delivering 36 channels) to watch TVRO (delivering 140+ channels). In that changeover process, the cable affiliates of the programmers are hurt and the entire cable programmer/cable affiliate distribution system is severely weakened. Nobody in cable wants to see that happen. *SPACE* may well be correct; on their own, prices for cable programming are not apt to come down.

And the losers here are of course those people in Libby, or who live outside of Libby where the cable lines do not reach. Their choice is to either discontinue watching the scrambled channels, because the cost of unscrambling the channels is disproportionate to the value received, or, move into town where the same services are available on cable for a fraction of the monthly cost. The net effect? The rural people of America, the very people who have benefitted so well from the availability of satellite TV, are directly

CSD TVRO CONSUMER REVIEW:

These Coop-created reports are available on a periodic basis with **HOTLINE** updates available (see below). Reports are mailed via First Class mail and address the following topics:

- 1) Status of **scrambling**, program service by program service.
- 2) Which TVRO receivers are **compatible** with M/A-Com Videocipher descramblers, and, which **versions** of the descramblers (there is more than one version out there; a little known fact that is causing great problems!)
- 3) Sources for descramblers, some at **discount** pricing.
- 4) Sources for signing up for programming, included discount-pricing for programming.
- 5) The latest **failures** (going out of business) in receiver and hardware.
- 6) Coop's rating (1 to 5 stars) for the **long term** survivability of all major and most smaller brands of equipment.
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- 8) System **pricing** guidelines nationwide.
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penalized. The system in effect restricts the flow of information to those who need it most.

ENTER THE 'Ku PLAN'

You will recall that DBS or Direct Broadcast Satellite(s) were first conceived more than 15 years ago. And, back in 1979, some 150 nations of the world convened in Geneva, Switzerland to debate and create a 'DBS Service' worldwide. This is one of those political/engineering issues which invites the cooperation of different nations since the potential for interference and information spillover is so great. *Not* discussed in Geneva was a proposal for DBS using the present generation of (C frequency band) satellites.

Because the Ku Band satellites would operate at a higher frequency, and use more power than the present satellites, far smaller receiving antennas were theorized; as small as 9 inches in diameter. Alas, seven years hence the technology required to accomplish this goal has not yet caught up with the 'DBS plans' formulated in Geneva. In fact, Ku frequency band development has been painfully slow. And some interim steps have been taken by firms such as RCA to get Ku band moving. *Continued on page 68*



BEAT THE SCRAMBLERS

There's No Need For Sports Fans To Panic

So, scrambling has arrived. But no need for sports enthusiasts to panic. The scrambling of sports events, it appears, is still a ways down the road.

In 1986, TVRO owners will still get as many baseball telecasts as they did in 1985. The number last season was 2,064. Bryan Burns, the director of broadcasting for major league baseball, said: "We don't have a target date. Possibly by 1987, possibly never. We still have a lot to learn about scrambling."

"Possibly never" is a key phrase here.

"Our situation is different than HBO's," Burns said. "HBO is a service that relies on monthly subscription fees, but people with dishes were getting the service without paying for it."

"To explain our concern, let me use an example. Say St. Louis is playing at Dodger Stadium, and the game is being televised back to St. Louis and is also being televised on Dodgervision. People with dishes can pick up the signals that are going back to St. Louis, while others are asked to pay to see the game on Dodgervision."

"Another example. Of the 81 home games Cincinnati plays, 55 are televised via satellite by opponents. I saw an ad in a Cincinnati paper in which for \$33 a month you can lease a dish. After 36 months, the dish is yours."

"So, if you are getting 55 home games on TV, you may not want to buy a ticket to Riverfront Stadium."

"Our two main concerns are protecting pay services and protecting attendance."

As for NFL games, the networks are mainly concerned with scrambling signals sent via satellite to affiliates, not scrambling signals originating from the sites of sports events.

But any kind of scrambling by the networks is not imminent. CBS assigned a task force to study the issue. The task force reported that scrambling is a problem because there are about 400,000 homes in the United States who cannot pick up its signal from an affiliate. Thus, if CBS scrambles its signal, those homes in what is called "white area" will shut out even if they are equipped with satellite dishes.

Because of this, CBS is moving rather slowly toward scrambling. And ABC is even farther behind CBS.

NBC, meanwhile, is less interested in scrambling than the other two networks because it primarily uses the Ku-band, which by itself protects its signal. Most TVRO units are not equipped to receive the Ku-band, although equipment is available to convert a unit so that it can pick up the Ku-band.

Jack Weir, NBC vice president of broadcast operations, said that NBC won't be scrambling either its C-band or Ku-band signals until at least the end of 1987.

NFL fans found last season that NBC's use of the Ku-band meant that occasionally telecasts were not available.

But any telecast that went to Hawaii
Continued on page 29

Over 2000 unscrambled games - that's the good news for home satellite baseball fans. Talk of scrambling is being discounted both inside the industry and out. The reason? Networks are mainly concerned with scrambling signals sent to affiliates, not scrambling the signal as it originates at the site of a major sporting event.



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Beat 'em from page 26

and Alaska was transmitted via a C-band frequency, and thus available.

Also, fans in Los Angeles wanting to watch the Raider-New England play-off game, which was blacked out because it didn't sell out in time, found the game was available on the Armed Forces channel, Satcom 2R, transponder 22.

Scrambling, it would appear at this time, is a long way off from affecting NFL telecasts.

As for pro basketball, Ed Desser, the NBA's director of broadcasting, said: "At this time, we have not taken any active steps toward scrambling."

Baseball's steps mainly have been toward the Hughes television network, a major transmitter of signals for baseball clubs.

Baseball has asked Hughes to come up with a plan for scrambling backhaul signals. Hughes in turn has contacted encoding system vendors. The frontrunners are M/A Com, General Instrument and Scientific-Atlanta.

Because of the vast amount of legwork involved in setting up a scrambling system for all of baseball, industry sources believe it may be years. Or as Burns himself said, maybe never.

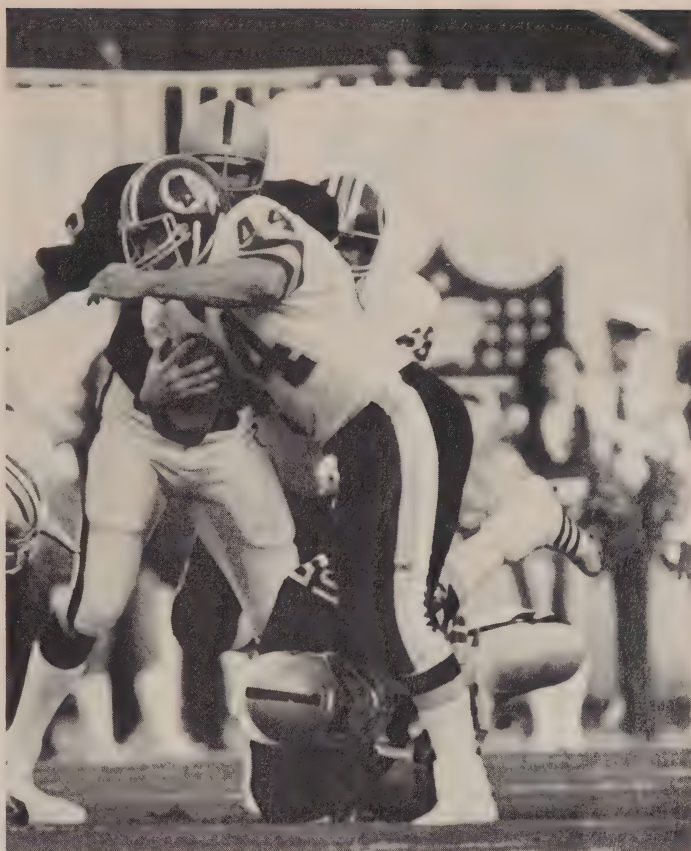
Wally Preimsberger, owner of the Wonderful World of Wally's, a satellite dish establishment in Van Nuys, said: "Let 'em scramble HBO and Cinemax. The movies they can show you can rent for a buck or two, anyway. About 75% of my sales are because of sports. You can still get all the sports. Sure, there's talk about scrambling sports, but so far it's only talk."

Philip Hochberg, a Washington attorney who represents the NBA, the NHL and other sports bodies, points out that the law permits viewing of only cable programming and not baseball games on local commercial stations and pay services or NFL games that are either blacked out or not intended for viewing in a particular area.

"I'll admit you've got a problem of enforcing this," Hochberg said. "You can't have a video enforcer knocking on everyone's door to see what is being watched."

The bottom line is, if sports was the main reason you invested in a home satellite dish, that investment is still a good one.

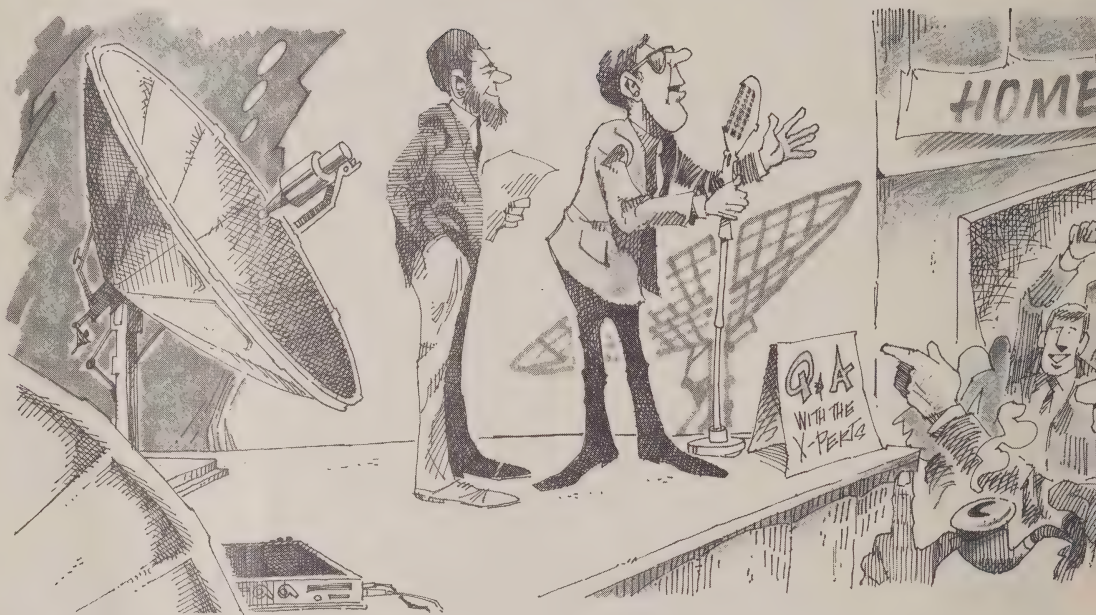
Someday, maybe you'll have to pay to descramble some sports telecasts. But, for now, things still look pretty good for the sports fan. ▀



Cleared of scrambling - The NFL, NBA and NHL look good. Few if any sports organizations have taken steps to keep the signal from home viewers.



The 10 Most Asked Questions



Receiving TV signals in our homes direct from satellites is a new technology, one with which most of us are as yet unfamiliar. To help our readers get to know the field, we at *Home Satellite TV* magazine are constantly featuring stories explaining the technology. Nevertheless, we often get calls about one aspect or another of the field.

We've logged these calls and have come up with 10 questions most frequently asked. If you're new to the field or even if you have an earth station, but have a question, look here first. You may find the answer you seek.

1. Are All The Channels Scrambled? Are They All Going To Be?

Scrambling is, by far, the hottest issue right now in home satellite TV. Any mention of it usually brings strong and emotional reactions from both sides. This can be all the more confusing to someone who's thinking about buying a system and wants a straight answer.

The truth is that right now there is no one straight answer. Last January, HBO and Cinemax began scrambling

their premium channels full time. A few other channels (X-rated) have long been scrambling. The Canadian satellites also have scrambled their signals for years. And some network feeds, such as NBC, are switching to Ku band which means that the standard C-band receiver would not be able to pick them up.

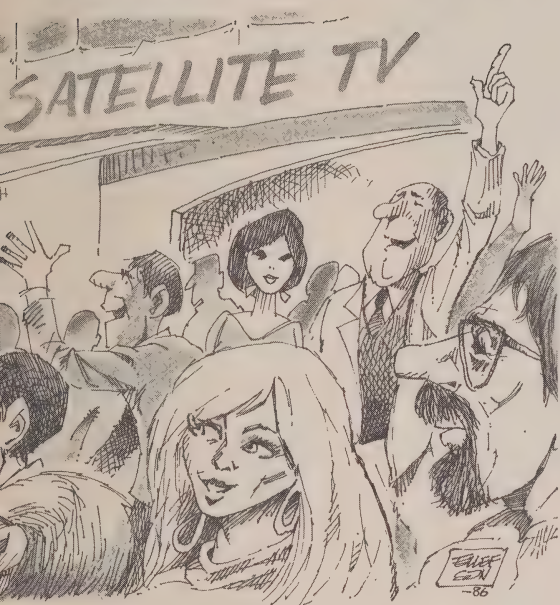
That leaves the vast majority of the channels (something like 130 of them) unscrambled as of today. Are these channels going to scramble?

Some have talked about it. But for now most seem to be taking a wait and see attitude. They are waiting to see what happens as a result of HBO's action in scrambling (read on).

What about descrambling the picture?

There are descramblers currently being produced by M/A-Com which can descramble both HBO and Cinemax. Should the other premium channels decide to scramble (such as Showtime), the same box should be able to descramble these. This box costs about \$300-\$400. In addition, there is a fee for receiving each scrambled channel. (According to reports from the field, the box currently descrambles *all* scrambled channels regardless of which service you pay for. But this may be a minor technical hitch which could be soon cleared up.)

About Satellite TV



The problem is that there are few of these boxes available. A spokesperson for M/A-Com suggested that the company only plans to build 200,000 of these descramblers for all of 1986. With roughly 1.5 million home earth stations already established and many more underway, this means that there's a lot of people who could get left out.

Largely because of HBO scrambling without making adequate provision for the distribution of descramblers to home earth stations, Congressional hearings have been set to look into the matter.

2. Will I Have To Fight The Zoning Commission In My City To Put Up A Dish?

Probably not anymore. Until very recently, there were a good many cities and municipalities around the country which had unreasonable zoning laws which discriminated against satellite dishes. Last January, however, the FCC (Federal Communications Commission) passed a ruling which helps to nullify unreasonable zoning laws. You may still have to take out a permit to put up a dish. But, as soon as local government bodies are made aware of the FCC ruling and act appropriately, unfair restrictions against dish-

es should become a thing of the past. (See the legal article by Mike Fennel on this subject in this issue.)

3. Should I Buy Now Or Wait?

That is the eternal question. At some point we have to realize that the new technology is not going to stop coming. Rather, we're in an age where the new is constantly replacing the old.

Remember when they first came out with television sets? Many people refused to buy saying, "We'll wait until they perfect the dang things!" The same held true with color TVs and more recently with VCRs.

Well, how long do you wait? Some people may still be waiting for the perfected TV sets. But in the meantime, they have missed years of entertainment.

The point is that there never will be a time when it's "perfected." It will always be changing. Either you get on board, or the train leaves without you.

4. How Does It Work?

That's a big question and whole books have been written to try answering it. However, it should be possible to convey the theory of earth stations in just a few paragraphs.

A few dozen years ago, a man by the name of Arthur C. Clarke (yes, the same who wrote the Space Odyssey stories) hypothesized that a satellite could be launched from the earth into an orbit just above the equator in such a way that the satellite's speed would just match the speed of the earth's rotation. In effect, the satellite would appear to remain stationary, unmoving.

The trick was to determine the exact height at which this would work. Clarke suggested it would be 22,300 miles above the equator.

He was correct and this zone has come to be known as the Clarke Belt. Since that time, hundreds of satellites have been launched and now hang suspended around the world in the Clarke Belt. Many of these are commercial "birds" (another name for a satellite) which send TV pictures down to earth.

The way this works is simple, in theory. A station broadcasts a strong signal (in the range of 1,500 watts) at a bird up in space. This is called "uplinking." The bird has special electronic instruments on board called "transponders." The transponders receive the signal from the uplink station and then rebroadcast it back to earth. This is called "downlinking." Because the bird is so high, it's broadcasting can cover a large portion of the globe, as much as a whole continent.

We here on earth receive these signals with earth stations. These earth stations consist of a parabolic dish which cap-

10 Questions

tures the signal and focuses it to a central point. At that point, an LNA (Low Noise Amplifier) picks up the signal and amplifies it thousands of times.

The signal is then changed from a very high frequency microwave to the sort of TV signal that our TVs understand. A receiver then amplifies and translates the signal so our TVs can fully utilize it and then it's sent to our sets where we see pictures direct from space.

Of course, it's not quite that simple. Along the way there are "actuators," devices which move our dish antenna so that it can aim at different satellites along the Clarke Belt. And there are Block Down Converters which allow us to watch different channels simultaneously from a single receiver.

But that's the gist of it. The technology is supersophisticated, but understanding it is not really that hard.

5. How Big A Dish Do I Need?

This is a very confusing point. To understand it clearly we must first understand that there are currently two separate types of broadcast frequency in use: C-Band and Ku-Band.

C-Band has been the standard for about 5 years. It is broadcast by Galaxy 1 and other video satellites.

Most of the broadcasts cover the whole country. As a result the signal is stronger in the central states than it is on either coast. (Assuming the bird is located at the center of the country. Some birds closer to one coast or another will have a different skew to their signal).

As a result, the closer you are to the heart of the signal, the smaller the dish you need to pick up the signal. The further away you are, the larger the signal. As a result, people in Oklahoma, for example, might get by with a 6 foot dish, while those in California might need a 9 foot dish to get the same clarity of picture.

The size dish you need is largely determined by where you live. You'll need to check with local dealers to help determine what's best for your area.

Then there's Ku band. This is a higher frequency signal and it does not require as large a dish. About a 3 to 4 foot dish in most parts of the country can pick up a fairly reasonable signal. The trouble is that currently there is relatively little programming on Ku band.

6. Can I Substitute A Lower Noise LNA For a Larger Dish?

This is a controversy that has raged among dealers. The LNA is the first amplifier located right in the center of the dish. It is rated not on its amplification abilities, but on the amount of noise it introduces into the signal.

A few years ago, LNAs with 100 degrees of noise (they are rated in degrees kelvin) were considered the best it was possible to produce. Recently LNAs with 65 degrees of noise or less have been produced in large numbers.

Some dealers feel that if you get a lower noise rated LNA, you can get a smaller dish. Does it really work?

Sometimes...and sometimes not. Usually not, particularly in fringe areas where the signal is weak. Regardless of the noise level of an LNA, you probably need a dish sufficiently large to gather the signal so there's enough of it to give a clear picture. Even a zero noise LNA won't help if the picture isn't there to begin with.

7. How Many Channels Will I Really Get?

The number of channels available fluctuates as some come on and others go off. A figure of about 130 is pretty close. Of course, depending on where you live and the quality of your system, you may not be able to get all of them.

8. How Much Should A Complete System Cost?

Today you can spend anywhere between about \$1,000 and \$5,000. Generally speaking, you get what you pay for. The more expensive the system, usually the better it will be at pulling in the signals. Also, the more expensive systems will usually have lots of bells and whistles such as automated controls that you may or may not want or need.

A word of advice, don't shop just for price. If you get the bottom of the line system you may find that you can only pull in one satellite (such as Galaxy 1) and this could put a real crimp in your viewing pleasure.

9. Do I Need A Remote?

No, you don't. It won't make your picture one iota better.

On the other hand, you also don't need an automatic transmission in a car. It's a definite extra. But, for comfort and ease of use both an automatic transmission and a remote are terrific.

We took a poll of the editors here at *Home Satellite TV* magazine. Everyone of us uses a remote control!

10. How Do I Pick A Good Dealer

It's not quite like Demosthenes holding his lantern high and searching ancient Greece for the honest man. But there can be problems and these should be avoided.

The biggest problem is that this is a new field and most of the dealers are new at it. Often they don't know a whole lot more about the technology than the customer.

This isn't always a problem, as long as the dealer has a competent person handling installations. But you don't want an untrained person installing your dish. You might get bad reception or, what's worse, it could blow over in the first storm.

Here are five things to watch out for when selecting a dealer:


1. Look for longevity. How long has the dealer been in business? Can he give a list of names of satisfied customers who still vouch for his services? Does he have a store or is he selling off the back of his van?

2. Will the dealer provide an adequate site survey? You can't place a dish everywhere nor on every property. Sometimes there is terrestrial interference from microwave transmissions. Other times there is no direct line of sight access to the birds. A good dealer should first come out to your home and then *guarantee in writing* his site analysis stating that you will get clear reception or your money back.

3. Does the dealer offer a variety of products or does he try to get you to buy the one receiver he had available? There are hundreds of receivers, dishes and so on out there. Do a little research yourself and find which one you want.

4. Will the dealer guarantee his work? If the system shorts out because of a faulty wiring installation, will he come out and repair it. Promptly?

5. Has the dealer taken certified courses offered by SPACE, the satellite trade organization. These courses help train dealers in the correct way to install earth stations.

Following these five guidelines may not guarantee you'll get a good dealer, but they should help you along the way. 

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TOMORROW'S



SATELLITES

Hughes Communications Is Creating Wonders For Your Future

BY BOB WOLENIK

5 years ago, a reasonably good satellite receiver system could have cost upwards of \$10,000 (today it can cost as little as \$1,000). Ten years ago, there were no home satellite systems, only commercial ones costing \$50,000 or more. And 20 years ago, there was virtually no satellite broadcast system, home or commercial at all. In fact, though it's hard to remember, the first manmade satellite, "Sputnik," was launched by the Russians only about 30 years ago.

We've come a very long way in a very short time. What's more, we are accelerating into the future. The developments in satellite technology now on the drawing boards test the imagination. They include terminals in grocery stores or businesses that are *two-way*! That's right, we'll be able to both downlink (receive the signal from satel-

lites) as well as uplink (send a signal to satellites) and thereby to other terminals all from a small business location.

In addition, there are plans for increased programming on a wide variety of birds (satellites), plans for Ku band video to receivers, even plans for two-way audio transmission (both downlinking and uplinking) from a moving car or van!

If it all sounds like Buck Rogers, hold onto your hat. Buck would never have dreamt of what's coming up on the satellite technology horizon!

In fact, things are beginning to sound so amazing, we at *Home Satellite TV* thought we'd better check it out to be sure we had our facts straight. So, we visited Hughes Communication Incorporated which, in one capacity or another, is involved with roughly 60 percent of all free world satellite systems.

DOWN HOME AT HUGHES

Hughes Communications is headquartered at El Segundo, California (a coastal suburb of Los Angeles). Dr. John E. Koehler, executive VP of the Communications company (a wholly owned subsidiary of Hughes Aircraft) took time out from a busy schedule to answer questions about what Hughes (and hence the industry) has planned for the future. He also gave us an opportunity to see the giant "bay" where satellites are assembled and tested in the 9 months time it takes for their final readiness. (It takes upwards of 3 years to build a bird from scratch.)

Our basic question to Dr. Koehler was simple, "What's on the drawing boards for the future in satellite broadcast technology?"

His answer was, "A great many things."

Continued on page 37

◀ **Launching a bird** - Plans for satellites via the space shuttle were momentarily set back by last February's disastrous accident. New plans, however, hope for operational Direct Broadcast birds to be launched as early as 1988.

Satellite control - The main operations room at Hughes controlling the bird's positioning and broadcasting. ▶

Photos courtesy of Hughes Communications, Inc.

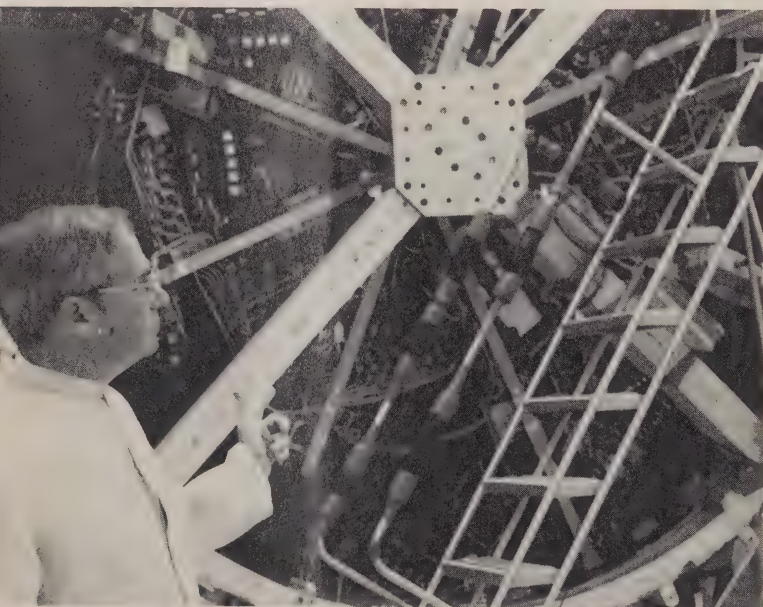


Tomorrow

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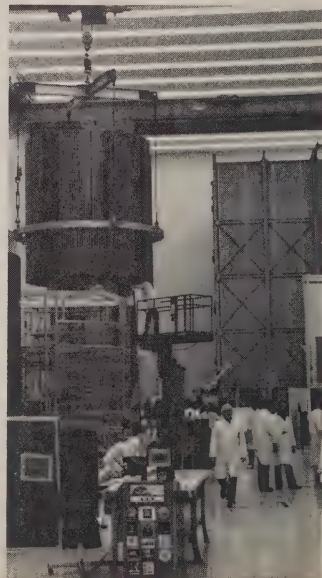


Moving into Tomorrow - The growth in satellite size (and power) dwarfing a worker shown for comparison.



Inner workings - Dr. John Koehler explains what makes it transmit.

Putting the birds together - Main bay at Hughes Corporation.



Dr. Koehler, who received a Ph.D. in economics from Yale in 1968, pointed out three areas that are undoubtedly of strong interest to owners and future purchasers of home satellite equipment.

DBS

One area of immediate interest was that of Direct Broadcast by Satellite.

DBS involves broadcasting direct from a satellite to personal earth stations. Rather than "listening in" on transmissions often intended for other sources, such as the feed for networks, DBS would be intended for and specifically aimed at the home satellite user. It could provide a wide array of programming that could enter everyone's home via tiny (by today's standards) dishes and receivers.

(Note: DBS as detailed here should not be confused with the old idea of DBS that was popularized about five years ago. The old DBS was based on old technology and it collapsed partly from technological difficulties and partly because of economics.)

Dr. Koehler pointed out that today's technology provides the opportunity for practical DBS. "We have the technology. The problem is putting together a package of programming that will make it successful from a business viewpoint. We (at Hughes) have 32 channels available for this type of service and we are having discussions, but we do not yet have arrangements."

Dr. Koehler pointed out that unlike current C-Band transmission, the new DBS will transmit on Ku band or roughly 12.250 to 12.750 gigahertz. The FCC, in cooperation with international authorities have designated a series of "orbit positions," each having the potential to broadcast 32 channels. (There could be one satellite at each orbit position or more than one, but only 32 channels.)

The essence of the new DBS is that it would be much more powerful than satellite transmissions of today. The FCC would allow higher signal strength at the ground meaning that smaller dishes would be needed to receive the signal.

The birds would be more powerful, too, perhaps as much as 100 watts per channel (as opposed to about 5 watts per channel on most satellites today). To be sure that there would be no problems with interference from adjacent satellites (overlapping of signals) the satellites would be positioned 9 degrees apart on the horizon. (Today's C-Band birds are currently being repositioned to 2 degree spacing.)

Dr. Koehler pointed out that two factors would lead to a smaller dish size. The first was the very nature of Ku band. Ku band is very high frequency and the higher the frequency, the smaller the dish required to gather it. Hence, by its very nature, Ku allows for smaller antennas.

In addition, because of higher allowed power levels, both on the ground and from the satellites, a smaller dish will be able to receive an adequate signal.

Of course, our next question was, "How big will these DBS dishes actually be?"

Dr. Koehler thought for a few moments and admitted that although the question was straight-forward, the answer was difficult to give with an certainty for several reasons.

"The size of the dish required depends on how we manage the power and shape of the beam. We're still working at optimizing that. For example, it makes a difference whether we lay the beam down over the whole U.S. (have 32 channels everywhere) or divide it, for example, by time zones.

"Hughes has an excellent location. We're at 101 degrees West longitude, the center of the U.S. and we have all 32 channels at that location so we can make such choices."

Dr. Koehler noted that lastly the dish size depends on the degree of availability that is desired. He pointed out that telephone satellite systems are designed to be available 99.99 percent of the time (unavailable .01 percent). Ku band, however, is susceptible to deterioration of signal due to certain weather conditions, particularly rain. Therefore he noted that they were aiming for 99.9 percent availability. "That's 10 times less than is thought desirable for phone transmissions, but it's still only a few hours out of the year that the system would be unavailable.

"If you're content to have sparklies (the result of interrupted transmission) a few hours a year, then we can get a smaller dish. In addition, some scrambling systems, such as B-Mac of Scientific-Atlanta, actually enhance the signal under these conditions.

"The bottom line is that you ought to be able to get very good reception anywhere in the country on DBS with dish sizes on the order of 65 to 70 centimeters, certainly under 1 meter. What I'd like to shoot for is a 2 foot dish, hub-cap size.

"We would like to make it happen in 1989. The technology work has been

going on. We have been spending design money and our divisions have been working on spacecraft design and trade offs. The first DBS bird was already launched by Japan in 1984 (DS-2). The second will be launched this year. The French will launch TDF 1 in 1987. The Germans will launch TVSAT in a similar period. We're also working with a company in Ireland to do something similar."

DBS could eventually consist of a whole series of satellites broadcasting hundreds of channels of programming to simple home satellite receivers.

"Programming is the problem. How to put together a package of programming that makes it a successful business. We are having discussions, but we do not yet have arrangements.

One final question we raised in this area had to do with costs. How much would such a DBS receiver cost? The answer? According to Dr. Koehler it should, "...cost no more than \$400 to \$500. That's the full system - receiver, dish, everything. That's the promise of the technology."

NETWORK STATIONS

Another futuristic idea that is moving along is that of network terminals. The idea here is that a series of low-cost two-way earth stations could be established that would communicate directly with satellites.

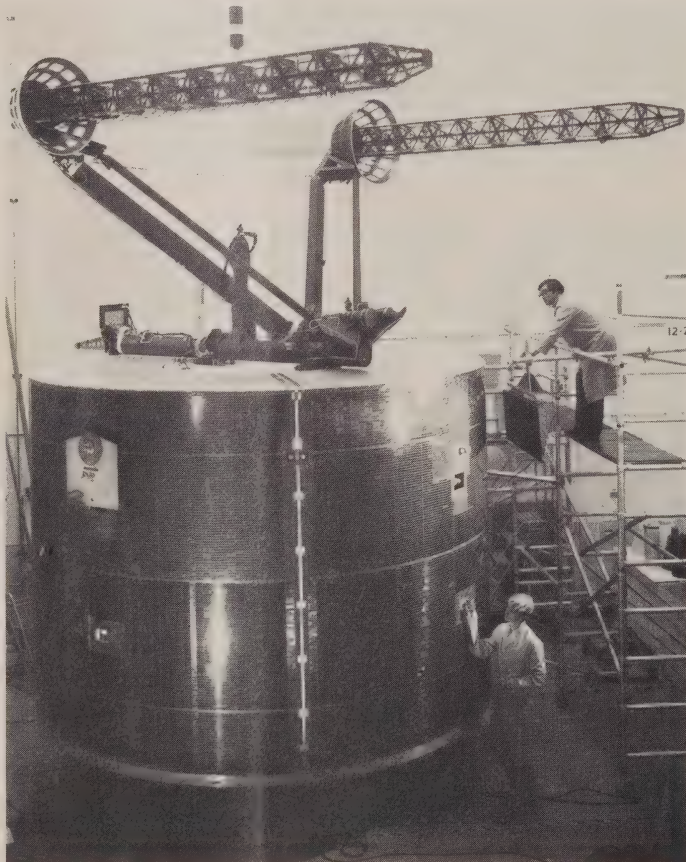
Each remote location could be in a store like 7-11 or Sears or at the remote location of a corporation. It would have full uplinking and downlinking capability—it could both send and receive signals to the satellite. In this manner there could be two-way communications between the terminals. The 7-11 stores or the Sears stores or the corporate locations could communicate directly with one another.

Dr. Koehler noted that Hughes has already applied for and received permission to launch a pair of Ku band 2 way communications satellites at 71 and 130 degrees for this purpose.

There are problems, of course. The primary one is that although the new satellites will be able to receive all the signals from the different terminals, they can only manage and then retransmit a limited number. To overcome this, the terminals located in the outlet stores would be part of a network. They would be like the perimeter of a wheel. At the hub of the wheel would be a central control which would give access to the satellites to the various terminals. If a 7-11 store wanted to uplink, for example, it would request access. Then



The actual launch - This photo was taken from the shuttle crew's compartment as a satellite was sent aloft. The size of the bird can be seen in the shot, below, of a similar LEASAT satellite being prepared for launch.



as soon as a certain frequency was available, it would receive permission and could transmit.

"We envision this as primarily for large corporations, probably not for individuals. However, we can fantasize that there might be some Stephen Jobs or a Wozniak (founders of Apple Computer Corp.) who might invent some technology and applications for individuals.

"Our hope is that the kind of terminal we're talking about can cost around \$10,000 in large quantities. It's not uncommon to find people spending \$5,000 on home computers. We can fantasize about this, but we have not yet been able to convince ourselves that there is a home market."

GALAXY

Of course, the prime satellite in the skies today is the Hughes Galaxy I. Dr. Koehler noted that the Galaxy program currently has three birds aloft (although only one is currently for video transmission) and has received approval for a fourth. "We are also interested in arranging for a successor for Galaxy, but that is years off. Galaxy I should last well into the 1991 or 1992 period. It's not pressing, but we would like to make arrangements to nail down that position."

OTHER DEVELOPMENTS

Dr. Koehler also noted that two-way transmissions from vehicles was also on the drawing boards (see accompanying article). We concluded by asking him what he thought about the distant future, toward the end of this century.

"The kind of services that can be provided will make it possible for no one ever to be incommunicado. You ought to be able to be in touch wherever you are with as much information as you need both with video as well as voice.

"There's going to be a development of both satellite and terrestrial systems. The cost of raw bandwidth is declining sharply. Every generation (of new equipment) we drive down the cost of raw transmissions. Even as the systems individually become more expensive, the capacity grows much more rapidly, they become more productive.

"There's just lots of opportunity for entrepreneurs to figure out how to use it. In a sense, if I were redirecting my career at this point, what I would be doing would be to figure out businesses that do things differently to take advantage of the fact that bandwidth is going to be cheaper than it is now and by a lot." ▀



MOBILE SATELLITE COMMUNICATIONS

*Sophisticated New "Dishes"
That Work In Moving Vehicles*

As satellite receiver owners well know, one of the most precise alignments which must be done in order to receive a signal from a satellite is the proper aiming of the dish. The satellites "hang" suspended (their speed matching the earth's rotation) in a band 22,300 miles up over the equator. To receive a signal from one of them, an earth station dish has to be aimed precisely at the "bird."

Aiming at the birds, in fact, has been one of the big problems that the armed forces, in particular, the Navy, have had to overcome. Ships often communicate via satellite. Can you imagine how difficult it is for a ship to establish communications with a satellite when it is

moving on the sea, constantly changing its position?

To overcome this problem, ships use motorized and highly accurate robot arms to aim their dishes. In that way, although the ship may be moving, the dish can remain aligned with the satellite.

That's obviously an expensive and difficult means of establishing satellite communications on the move. It's something that would certainly not lend itself to commercial applications in automobiles.

The people at Hughes Communications, however, believe they have a way around this problem, a way to establish 2-way communications at low cost be-

tween any car or van and a satellite while the vehicle is moving!

According to a Hughes spokesperson, for the technology to get off the ground, the FCC has to first allocate a frequency band for it. As of this writing, the FCC has not yet allocated frequency clearance for a mobile satellite service, but is considering the matter.

When the FCC acts, it would mean that a clear channel would be established for two-way audio communications similar to cellular phones, not just in the cities (where cellular may already be established), but everywhere in the entire country!

Another key to this technology is a different kind of antenna called a

Mobile

"phased array." It would look like a pie-plate on the top of a car or van. It might be 6 inches high and looking down from the top, circular in shape, perhaps a foot or two across.

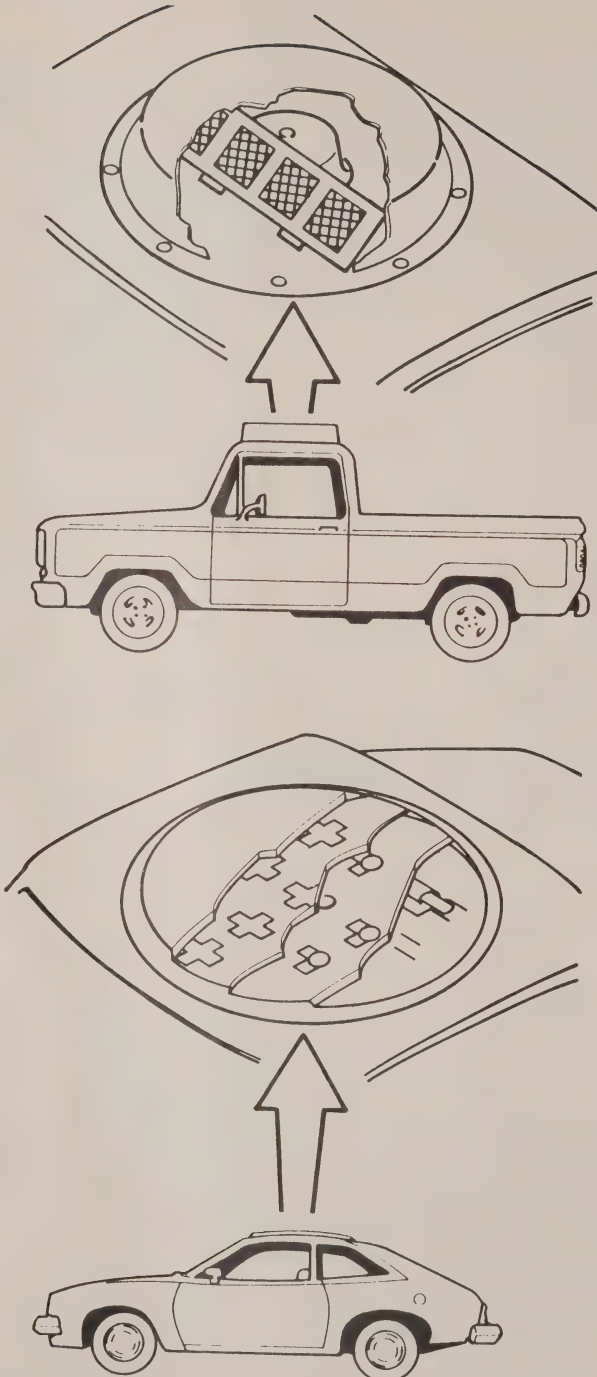
The idea is that because the antenna is non-directional, it could communicate in any position with the satellite. (Of course, it goes without saying that the satellite has to be super-sophisticated and highly sensitive in order to pick up the distant signal of such an antenna.)

The person inside the vehicle would have a phone-like device. Calling would simply be a matter of dialing, similar to the way it's handled now from our home phones. The difference is that we could be in touch, anywhere, anytime, even while on the move.

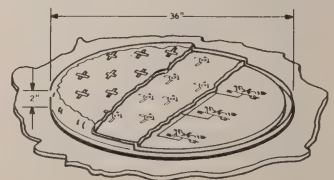
The people at Hughes are hoping that the FCC will authorize a frequency which is close to that used by cellular phones so the two systems can be compatible. There is resistance to this, however, because other entities such as police authorities want to control these bandwidths. Moreover, at these frequencies, it would be practical to use an omni-directional antenna than the more expensive phased array.

The technology will depend to a large extent on how the FCC rules as well as whom they choose to be the carrier. The people at Hughes note that if they are chosen, they anticipate that they could put the business and technology together so that it would be in the works by 1988 or 1989.

As a sidelight, it's interesting to note that the government already has a "ManPac" mobile satellite unit. This consists of a receiver carried in a backpack and a foldup dish antenna. The person carrying the device can establish communications anywhere in the U.S. simply by aiming the dish in a southerly direction. That's close enough from this hemisphere to line up with a satellite and to, thereby, get linked up. If this is already available, can mobile satellite services by car be far behind? ▀



Phased Array - Unlike today's dish antennas, a phased array antenna can electronically both send to and receive from a satellite. For mobile units in the future, a cheaper omni-directional antenna (which doesn't use such electronics) may be the likely choice.



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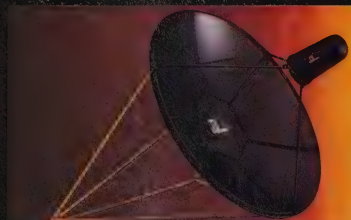


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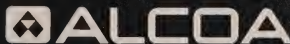
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Tuning Into



KU BAND

The Sky Is Filling With Programs For The "Baby" Dishes

BY DAVE SHELDON

Recently, I spent an evening tuning into the latest Ku-Band satellites just to see what new services are available. Previously, my Ku-Band viewing had been somewhat limited, a few AFC football games from NBC Sports, and the regularly scheduled NBC programs were about it. In fact, I really hadn't ventured beyond SBS 3 with much success. Besides a glimpse at some undiscernible picture from GStar, I have to admit that I hadn't been doing much 12 GHz pioneering.

This had to change. I simply couldn't sit still, tuned to good old Galaxy 1 while the whole Clarke Belt became a flyway for high-powered, high-frequency birds. I was ready to go hunting in satellite land.

Well, if you're going to stalk big game you had better have the right gun. For this excursion I was equipped with Chaparral's new Shotgun feed system. The Shotgun combines a 12 GHz Polarator and LNB set into the scalar rings of Chaparral's 4 GHz PolarAmp LNB. This is the entire front end of the system for reception of both C and Ku-Bands. A special bracket allows mounting of the 12 GHz feedhorn at the prime focus with the 4 GHz feed offset by 3 5/8". The dish was nothing less than the 3.8 meter Paraclipse, and for a receiver/actuator system I was fortunate enough to be using the Chaparral Sierra.

After carefully aligning the dish to receive all of the C-Band satellites, I was ready to go looking for my first Ku bird. I had checked my measurements several times to assure that the dish was tracking. Since the beamwidth for a 12 GHz signal using the 12 foot Paraclipse dish is less than half a degree, there is really no margin for error if you expect to track the Ku birds.

Being familiar with the NBC programs on SBS 3, I decided to look for that satellite first. Formatting the Sierra System to tune to SBS 3 is fairly easy; just call up a name

for the satellite (such as S3) then store 12 GHz tuning and inverted video polarity for the satellite.

Once the receiver was formatted and an active channel on SBS 3 selected, I used the remote control to move the dish to aim in the direction of the satellite. I was lucky, and got pictures on the first try. There was NBC anchorman, Tom Brokaw with lots of sparklies. After fine-tuning the video frequency and pressing the Sierra Auto Tune button to automatically adjust the polarity, Tom was looking pretty good. I tuned up the audio and he even talked.

Still not finished tweaking, I used a DC volt meter at the dish to fine tune the mount and feed alignment. Now the NBC Nightly News looked great. In fact the picture quality was as good or better than anything I had ever seen on Galaxy 1, the strongest C-Band satellite.

The programming guides list nine active channels on SBS 3. I counted only four that evening, three NBC Network feeds and a basketball game. The others were blank or had color bars. Since so many of the 12 GHz transponders are used for news feeds, it is not uncommon to see pictures come and go randomly as news stories and sports programs bounce across the globe.

With one satellite under my belt I decided to go searching for another. Using my programming guide like a road map, I set up the Sierra System to tune to GStar 1. Actually there are three other SBS birds west of SBS 3, but since none of them have any active video, I decided to keep on driving. With my finger on the throttle, I headed west, further and further into the frontier.

Like an out-of-control Marlin Perkins in four-wheel-drive, I kept my eyes glued to the TV tube, ready to stop at the first sign of any color. And there I remained, fixed on the target until the receiver went "beep" and a message on the front panel informed me that I had just reached the west dish limit. In other words, I had driven right past the satellite without even seeing it.

Well, if at first you don't succeed . . . I verified that I was tuned to the correct channel to receive ESPN, the 24-hour sports network, and hit the button to return to the east. However, this time I moved the dish more slowly, stopping every few clicks of the actuator to look for a sign of color which would indicate that I was getting close to the satellite.

Finally I came across some very poorly tuned video, which after a minute of tweaking was beginning to look like a tennis match. After the picture was the best that I could make it, I stored that channel and went searching

Small dish, big picture - Installation of Ku band is easy and can be handled on the roof as well as on the ground. Recent programming suggests that future viewers will have plenty to watch including NBC programs, a variety of AFC football, movies, sports and even French television shows.

Photos courtesy of Ku-band World magazine.

Ku Band

through the channels for more pictures. To my surprise, I found two more networks with which I was already familiar, Cable News Network (CNN) and Showtime.

Holiday Inn uses two transponders on GStar 1 for its HINET package which includes programming from Biznet, WTBS, and Satellite Cinema as well as teleconferences between the various Holiday Inn locations. Although HINET has announced plans to scramble using Scientific Atlanta's B-MAC system, on this particular evening it was in the clear.

After considerable tuning of the video frequency and polarity, I was able to receive fairly good pictures on GStar 1. Some of the transponders on this satellite are 54 MHz wide with two 24 MHz channels sharing the transponder. This narrow bandwidth may have been the reason for the less than perfect video.

On the advice of a technician friend I had connected a Phantom Engineering IFP 1x variable bandpass filter in the Sierra 70 MHz loop. By narrowing the receiver bandwidth to 18 MHz on several of the channels, I was able to

improve the video quality considerably.

I was tempted to run out to the dish and try to peak the system performance even more, but decided to leave well enough alone since any changes to the dish alignment at this time would also affect the reception of SBS 3. Besides, with darkness falling I figured that any further dish tweaking could wait until daylight.

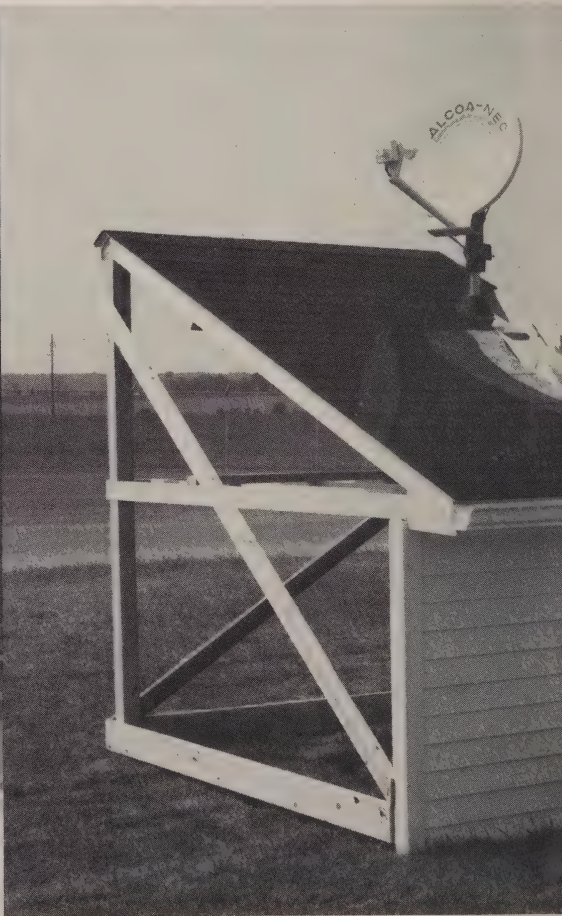
With GStar 1 stored in memory I was ready to search for the elusive Anik C3. At 117.5y west, this satellite is the nearest active Ku bird to San Jose, California. There are actually two other Anik Ku satellites, C1 and C2, between GStar 1 and C3, but since neither one is currently broadcasting any video I decided to give them a miss.

With the same technique that I had used to locate SBS 3 and GStar 1, I began to stalk the Canadian bird and was surprised to find some scrambled video right away. Satellite viewers who often tune to the Anik C-Band satellites know that it is not uncommon to see scrambled channels on the Canadian birds.

I was able to tune to several clear channels on Anik C3,

Wave of the future? *A new transmit/receive antenna from Scientific-Atlanta may just be the start of Ku band "miracles."*

Troublefree? *Having the dish under 3 feet across means that wind and weather are much less troublesome.*



but found the signal level to be down considerably. I believe this is due to the fact that the majority of the Canadian signals are aimed to the north and are therefore considerably weaker in Southern California. With the narrow band-with filter and perhaps a little more tweaking on the dish I probably could have made these channels much better. However, I figured that I had done enough fine-tuning for one evening, so I stored the Anik C3 channels with plans to come back to them later.

After bagging three Ku birds I decided to hang it up and watch a little TV. GTE's Spacenet 2 and RCA's Satcom K2 would have to wait for another day. Bird hunting can get a little bit tiring, but with a system as easy to operate as Chaparral's Sierra, equipped with the Shotgun dual LNB on a 12-foot Paraclipse, it was like shooting fish in a barrel.

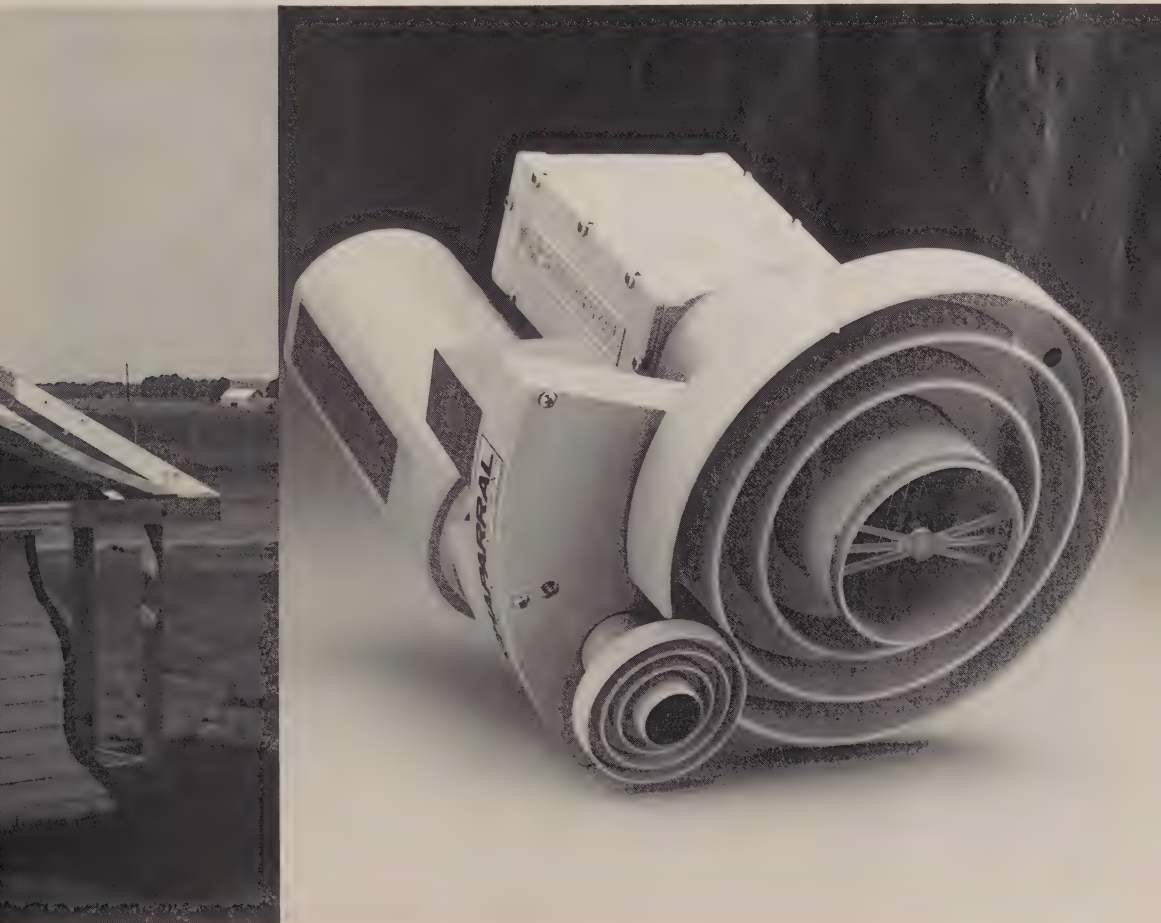
One of the nice things about a system like this is that returning to the more familiar C-Band satellites simply requires pressing three buttons on the remote control. When you wish to venture into Ku-Band again, the same procedure recalls any stored 12 GHz bird.

Suddenly the frontiers of satellite entertainment have been opened wide, and judging from the number of recent "Ku Compatible" systems on the market, it appears that there will be plenty of bird hunters pioneering the Clarke Belt with their Shotguns in hand.

The rewards for satellite viewers with dual band systems are many; NBC programs, AFC football, movies, sports, French programs, and numerous news and teleconference feeds are just a few of the current offerings. Although the recent Challenger Space Shuttle tragedy will slow Ku-Band development considerably, there are currently eleven domestic 12 GHz satellites which should fill with programming soon. Satellite viewers with a taste for adventure will find plenty of new horizons in the Ku-Band.

As for me, after a big day of bird hunting I decided to return to more familiar turf. I finished my excursion back at Galaxy 1 watching the Nashville Network. Yes sir, there's nothing like a little pickin' 'n' grinnin' to make a country boy feel right at home after an evening of high tech hunting in satellite land. 'Til next time. ♣

Dual feed - The "shotgun" from Chaparral is a dual LNB feedhorn which is designed to capture both C-band and Ku.





Guaranteeing Service

It has gotten to be quite easy to buy a satellite system. Even the smallest communities have one or more satellite dealers offering a wide variety of systems from which to choose. In most cases your purchase simply requires that you select the equipment and payment plan that suits your needs, and schedule the time for the installation. In the excitement of buying your new system, make sure that you don't overlook the details of maintaining the equipment. By spelling out the responsibilities of the dealer for system maintenance, you will be assured of a more satisfactory purchase.

If you're purchasing a high quality system from a reputable dealer, the chances that your system will require any maintenance are pretty slim. After all, the solid-state components in the system are designed to operate constantly for many years. None-the-less, even if you're buying the best system available you should make arrangements to have the equipment serviced in the unlikely event of component failure. Here are some suggestions on how to make sure that the purchase of your system includes sufficient service.

GET IT IN WRITING

Whether you're buying your satellite system from a mail-order company, a department store, or a full-service dealer you must get the details of the warranty in writing. This information may be provided on the purchase agreement or on a separate list of the specific responsibilities of the seller. The specifics of the warranty will probably vary from one dealer to another, but there are certain details that are universal.

THE MANUFACTURER'S WARRANTY

It is ultimately the responsibility of the manufacturers to warrant the various parts in your system. Since your system may be made up from components built by several manufacturers, it is possible that you will get several warranties, each one reading differently. Satellite component manufacturers usually warrant their products for one or two years. The warranty has certain limitations which should be clearly understood at the time of the sale. Read

the various warranties carefully before finalizing the purchase of your system. Your dealer can help you to understand any details of the manufacturer's warranty which are not clear.

THE SERVICE AGREEMENT

Any service to be provided by the dealer beyond the manufacturer's warranty should be included in a *written* service agreement from the dealer. This may include provisions for service calls, repair or replacement of defective components, service required due to wear and tear, or any other system maintenance which may be specified.

You may save some money in the purchase price for the system if no service beyond the manufacturer's warranty is included. If so, this will be spelled out in the contract. More likely, however, the dealer will provide you with some level of service after the sale. Make sure that you get all of the specifics in writing.

Although there are no standard to typical service agreements for satellite systems, many dealers will provide for some or all of the following service requirements with the sale of the system:

- * Pre-installation component burn-in.
- * Complete system operation instruction.
- * 30-day free service calls within a certain distance from the store.
- * 30-90 day free replacement of defective components.
- * Nominal charge for service calls during the first year.
- * Long term service for the duration of the sales contract or beyond.

It is best to discuss your needs with your dealer before finalizing the sale. You may be able to get a service package that is custom tailored to your needs. Expect to pay extra for this service, and for the peace of mind that you will have, knowing that your system will be well maintained.

LONG TERM SERVICE CONTRACTS

Dealers and service companies can provide service beyond the term of the manufacturer's warranty through what is generally referred to as a long-term service contract. This type of agreement may be required by a finance company or bank if

you finance the purchase of your system. You can also voluntarily assign long-term service responsibilities to the dealer at the time of the sale. You will probably pay about \$100 per year for this type of service.

Typically, service contracts of this type will call for maintenance of the system on a regular basis with the provision for loaner equipment if a component should require factory service.


There are often numerous limitations to a long-term service contract. It probably will not extend beyond three years, and may have decreasing coverage from year to year, or increasing premium through the term of the contract. Remember too, a service contract is only as good as the company through which it is purchased. It is advisable to take the advice of a reputable dealer in your community with regard to the service of your system.

WHAT YOU CAN DO

Each month, this column covers basic installation and maintenance procedures which you and your dealer can perform. It goes without saying that an expensive piece of equipment such as a satellite dish or LNB deserves some basic maintenance if it is going to last in a harsh outdoor environment.

You can help to assure that the system will perform well if, at the time of the sale, you specify that the following conditions are met:

- * The dish site must be "swept" with a spectrum analyzer to determine if it is subject to terrestrial interference (T.I.). If T.I. is present, insist that the dealer specifies the steps that will be taken to minimize its effects.
- * The dish and electronic components must be properly grounded to reduce the risk of lightning damage.
- * The outdoor components must be properly weatherized to prevent water damage.
- * Any steel parts must be properly painted or plated to avoid rusting.
- * The cables must be of high quality, and must be installed inside of conduit to prevent damage.
- * The receiver must be properly ventilated so that it is not subject to overheating.

Your satellite system is designed to give you many years of service, and your dealer will do everything that he can to assure that you are satisfied. After all, satisfied customers are the best form of advertising. By making sure that every detail of the service after the sale is clearly understood at the time of the sale, both you and your dealer will benefit. You can expect to pay a little more for professional service, but it will be worth every penny. 

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Home For A VIDEOPHILE



After The Dish, The Next Step Is A Real Home Entertainment Center

You've bought a satellite dish receiver and it's set up, connected to your color TV. You sit down after a hard day at work and you're all set to enjoy the finest that home entertainment can offer, right?

Maybe not! Today more and more home satellite receiver owners are discovering that there's a lot more to home entertainment than programming—it's the quality of enjoyment offered by the system.

It's a relatively new concept borrowed partly from movie theaters and partly from designers. The idea is that home entertainment is more than just TV and stereo—it's a total presentation that can provide a step up in enjoyment for those who have it.

The buzz words are "entertainment center." The center is really just a focal point for a technologically enhanced environment. Of course, just reading about it can't do it justice. You have to *experience* it.

A good home entertainment center is as far removed from color TV and a stereo as is a modern Dolby equipped movie theater from a slide show presentation at a high school gymnasium. The video is only one aspect of it. The sound phases in from many directions (see the following article) and surrounds your body. Even your toes seem to vibrate. It's not 3-dimensional (not yet), but you seem to be where the image on the screen takes you. It's as close to participating as we can come without actually being there at the filming.

That's the experience when it's "on." When it's off is another experience. There are two current design trends here. The first might be called "display" while the second termed, "invisible."

In both design trends the entertainment center might include a color TV, satellite receiver, stereo system, VCR and speakers. However, in a "display," these items are not only visible, but are placed in such a way as to catch the attention. They tend to "show off" the high tech interests of the owner.

The "invisible" center, on the other hand, tends to be preferred by the most stylish designers of today. Here the components are artfully concealed in high quality furniture. Sometimes even the TV isn't visible unless it's turned on. You could be standing in the heart of the center and not even know it!

Regardless of what trend you opt for (if any), a home entertainment center should be a consideration. It can turn an ugly area of the room with wires coming out in all directions into an eyecatching centerpiece. It can turn dull video into a resonating experience. For perhaps the first time, it can allow you to really enjoy the benefits of high tech sight and sound.

The ultimate high-tech entertainment center - Everything you could want to please the eye and ear. Courtesy of Home Entertainment Magazine, photo by Nick Basilion.



Pouring On The SOUND

Adding The Ultimate Realism To Your Satellite Picture

BY TIM HARRINGTON

This is the second of a series of articles that will focus on the concept of designing and integrating a satellite TV system into a complete home entertainment center. These articles will cover a variety of topics such as:

— Designing a home entertainment system from the ground up.

— Connecting your satellite TV system to your stereo.

— Setting up a true theater Dolby Surround Sound system.

— Cabling your home for video and sound wherever you want using modern cable company techniques.

— Remote control of your home entertainment system from anywhere in your home.

— Products and concepts of home entertainment that have yet to be developed.

— Switching and dividing equipment to control the distribution of video and audio programming throughout your entertainment system and your house.

As people acquire more and more video and audio components such as stereo systems, VCRs (Video Cassette Recorder), satellite TV systems and video and audio laser disk players, they will be more inclined to connect them together in such a way that any program source can be enjoyed from any TV set in the house. Furthermore, recording and playback

devices can easily share programming. Instead of operating as separate units, they will become part of a complete home entertainment center. As additional equipment is purchased, such as a video cassette recorder, it is simply wired into the system. This is a case where the sum of the parts is greater than the whole.

This particular article is the second of two articles on Dolby Surround Sound and will go into greater detail on how to select and set up a Dolby Surround Sound system in your home.

What Is Surround Sound?

Simply stated, Dolby Surround Sound is a four channel recording process which, when properly decoded during playback, provides a startling sense of audio depth and impact to a movie experience. Unlike the Quad process with four speakers, one in each corner of the room, Dolby Surround Sound uses a diamond arrangement with a front left and right speaker, a front center speaker and a rear speaker. Later I'll discuss how additional speakers can be added to this arrangement for enhanced effect, the concept of a diamond will help you understand the playback arrangement of the channels.

Understanding The Surround Sound Process

The Dolby Surround Sound process uses a 4:2:4 encoding/decoding process which simply means that four

channels are recorded and encoded down to two and decoded or processed back into four channels during playback. These four channels carry sound information to left, right, center and surround speakers. The surround channel provides both ambient sound, subtle background noise (such as rain, wind, traffic etc.) which gives a sense of place and special effects (such as helicopter flyovers, rockets, etc.). The center channel is situated front and center with the picture and contains the voice information. The voice channel is one area that differentiates brands and models of surround sound decoders. The center or voice channel is optional in that some processors provide all four channels and others provide only three, left, right and rear. This is not necessarily a disadvantage and the type you choose should depend on factors that are relevant to the location and set up of your system.

Basic Differences Between Processor Models

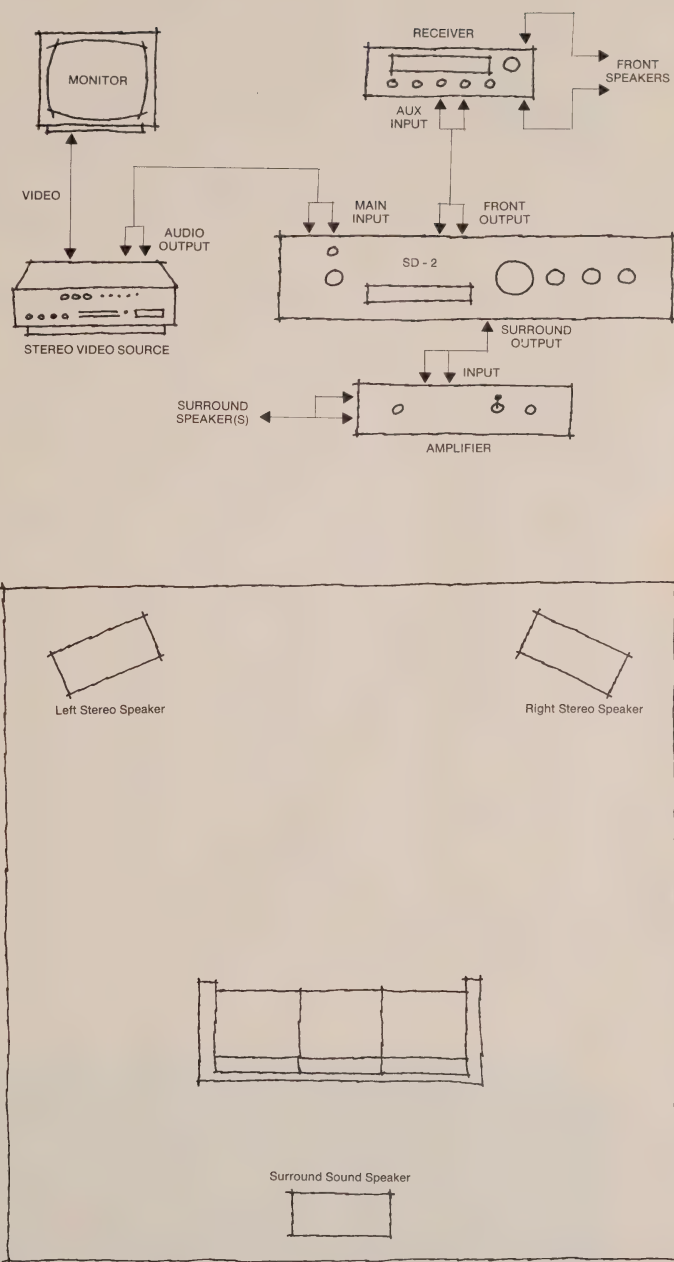
In order to help select equipment, connect and wire a system and plan for speaker selection and layout, an understanding of the basic differences between equipment available and setup options will be important.

Although there are many differences between various brands and models of surround sound processors, there are a few basic features that you should be aware of before purchasing a surround sound processor.

The first consideration is whether or not there is a decoded center front channel provided for the dialog or voice portion of the audio. You might assume that units with this option would be "better" units. This is not necessarily true because various factors affect the end result, such as the size of your viewing screen, the size of the room and how far apart your left and right front stereo speakers will be. If your stereo speakers will be relatively close to your viewing TV and the screen is a standard size of 26" or less, then the speakers will probably be close enough for them to create a "phantom" or perceived center dialog channel. Keep in mind that the dialog is contained on the left and right channels but that if these speakers are too far apart without a center channel speaker then there will be an undesirable "hole in the center" effect created. In this case you probably should strongly consider a surround sound processor with a center channel. Some people feel that the three front channel arrangement is more desirable even with smaller screen TVs because it will help provide a stable stereo image (meaning it will still give you stereo depth of sound) over a wide viewing area and enhances viewing enjoyment for a larger number of people. All Dolby licensed Surround Sound decoders also include a special form of Dolby B type noise reduction. It decodes the B-type encoding that was applied to the surround channel when the sound track was recorded. Dolby literature states that without B-type noise reduction you might experience such errors as random sibilant (hissing) sounds or artificially bright highs in the surround output. Some manufacturers claim that their surround sound processors which do not contain Dolby circuitry will decode Dolby encoded Surround Sound programming. Dolby literature states that only their "carefully engineered circuitry decodes the Dolby Surround matrix accurately".

Since surround sound processors produce one or more additional channels than a standard stereo system, these additional channels will have to be amplified. Some processors contain an additional amplifier for the extra channels and some do not. If you have an extra amplifier left over from an old system, you may want to save some money and use it with an unamplified surround sound processor. Even if the amplifier is not as good as

Continued on page 54



Surround Sound System - It requires a special decoder as well as an additional speaker(s).

Sound

your current one, remember that the surround sound channel and the dialog channel contain audio information that is much more limited in frequency range—only up to about 7 to 10 KHz.

As the concept of Surround sound catches on, manufacturers will probably begin to include the Dolby Surround circuitry in some of their standard stereo receivers. It is already beginning to appear in a new type of home electronic equipment that is a combination stereo receiver, TV tuner (used for monitors without tuners) and video and audio switching control center. Some of these units can also control all of these features including an audio cassette recorder, compact disc and turntable by remote control. If this concept intrigues you as it does me (I already own one), set aside some time for shopping and comparing features between different units. They do so much that it may take you awhile (as it did me) to really comprehend all of the features available and to decide which ones you want.

Deciding How To Set Up Your System

I have selected the Audionics Surround Sound Dolby Sound Processor to use as an example because it is a reasonably priced unit that is unamplified and decodes all channels available on audio programming encoded in Dolby Surround Sound. The Audionics unit does not contain an amplifier so all drawings will show on amplifier. You can ignore the use of an amplifier in these drawings if the unit you select contains one.

Although there are many optional variations for speaker selection, set-up and placement there are three basic system configurations. It will help you to understand the more complicated arrangements if you learn and understand these basic ones first.

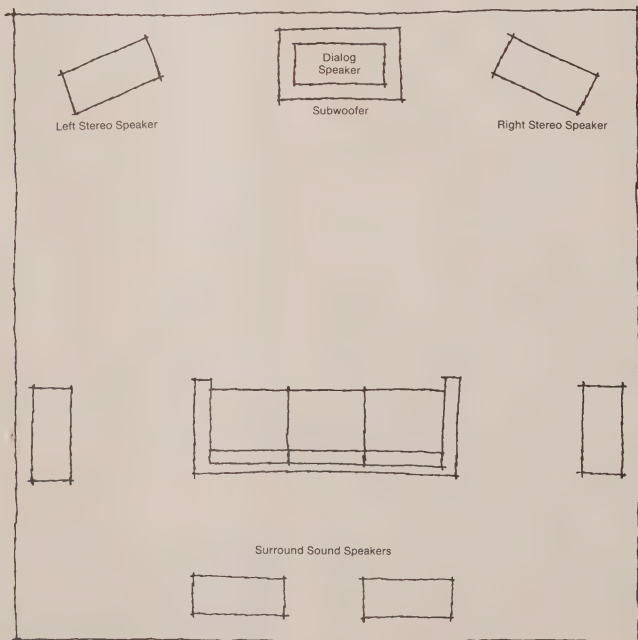
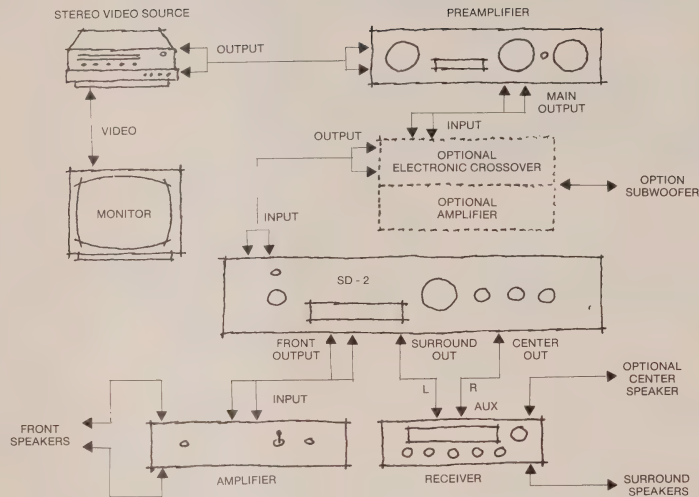
The first arrangement is two front speakers, left and right stereo with one or more rear surround sound channels. This is a three channel set-up.

The second is the same as above with the center dialog or voice channel added.

The third is the same as the second with a subwoofer added. Imagine, if you will, being able to feel rockets, earthquakes and other low frequency special audio effects. It's incredible!

Wiring The Surround Sound Channel

A surround sound channel is used



Ultimate Sound - Subwoofers and multiple speakers bring the rumble of earthquakes and other audio effects right into your room. It's as if you're in a Dolby Sound movie theatre.

in the motion picture theater to produce special audio effects as well as ambiance. To insure that each viewer perceives the same effect, the surround sound channel is monophonic and distributed by a series of loudspeakers around the rear and sides of the auditorium.

In the recent past, the approach used in quadraphonic sound reproduction was to place the left and right rear speakers in the corners of the room. A series of speakers is more ideally suited for use with Dolby Surround. The audio bandwidth of these speakers need not exceed 10 KHz on the upper end and 80 KHz on the low end. The idea is to distribute a uniform surround channel sound field. While a single surround speaker can be used in the home with adequate results, better performance will be achieved with two and optimum performance will be achieved in most home environments with four surround speakers, two on the back wall in the rear of the room and at least one on each side wall flanking the seating area. This approach provides a distributed sound field, just as in a motion picture theater, and will allow a large number of guests to enjoy correctly reproduced sound.

If you use more than two speakers, remember the impedance of the chain of speakers is likely to be lower than four ohms if wired with parallel connections. Many amplifiers, especially older receivers and integrated amplifiers, may become electrically unstable with loudspeaker loads of less than four ohms. If you are using an older stereo amplifier or receiver for the surround channel and wish to optimize your system with four surround speakers, you can wire two eight ohm speakers in parallel and connect a pair to each channel. Place the stereo/mono

switch on the integrated amplifier or receiver in the mono position.

The surround speakers in motion picture theaters are usually located substantially above ear level which is a necessary compromise. If the furniture and decor of your room allows, you should try to place the surround sound speakers at or just above seated ear level. A height of 40" to 50" above the floor is ideal and will provide a surround sound effect superior to that produced in a motion picture theater. The integrated sound fields from the front and surround channels become three dimensional and you become a "participant" rather than a spectator!

Surround Sound Systems Can Grow

One really nice aspect about surround sound is that even though a basic system really enhances video enjoyment, there is tremendous room for the growth of a system. You can start out with just three speakers, left, right and rear and then later (with some models) add a front center, more rear speakers and for the ultimate a subwoofer.

When building your home entertainment center remember that audio and video systems operate as a complete system and just as with a satellite TV system, the total performance of the system will only be as good as the weakest link in the chain of components that work together to bring you good quality audio and video.

I have not discussed price so far because it can vary dramatically depending on how extravagant you want your surround sound system to be. The Audionics unit carries a suggested retail of \$395.00 and to that you would add an additional stereo amplifier of at least 20 watts and two or more additional speakers. Fortunately the additional speakers do not have to be ex-

ceptional quality since the additional surround sound channels carry audio information that "fills in" information to your brain to create a much fuller sound experience. The sound from the surround sound channel ranges from approximately 100 Hz to 6000 Hz which means that a good quality midrange speakers will suffice for the surround sound channels. A subwoofer can be added to this arrangement if you would like the deep rumbling of explosions and other effects that add so much to the "theater experience".

If you haven't personally experienced Dolby Surround Sound, I highly recommend that you give it a listen. If the system is properly set up, you'll be spoiled for life.

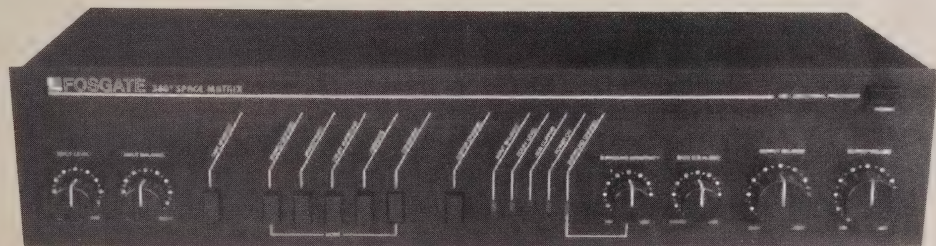
TECHNICAL CORNER

In a Dolby Surround Sound recording, the three front channels are recorded in-phase, with the center channel recorded equally on both tracks. The surround channel is recorded out-of-phase on both tracks. Decoding the audio information follows the same pattern in reverse.

Special thanks to the folks at Audionics for their support in supplying technical information used in this article. They can be contacted at 5785 N.E. Columbia Blvd., Portland, OR 97218 (503) 287-2344.

This article is an excerpt from a book on home entertainment systems by Tim Harrington to be published in the future.

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Special components - Sound processors and decoders are required to get true Surround Sound. Note: this is quite different from "quadraphonic sound" popular a few years ago. Shown is a Fosgate directional processor.

Dishes For The DESERVING

A Heart Warming Campaign To Bring Satellite TV Comforts To Suffering Children

BY PHILIP PATTERSON

Based upon their son's experiences, Preston and Shirley McPhail decided that a child shouldn't have to fight disease and boredom at the same time. And even though their 3½ year old son lost his battle against disease in June of 1984, the McPhails are still fighting and they are using satellite dishes as ammunition.

For more than a year, the McPhails watched their son, Scottie, slowly die of neuroblastoma, a cancer of the sympathetic nervous system, in Oklahoma Children's Memorial Hospital in Oklahoma City. Months later, they still remembered the more than 200 children in the hospital and wanted to help. Burned into their memory was the boredom young Scottie faced as he was undergoing treatment.

"Some of the chemotherapy treatments could take up to six hours. The older ones could read, but the younger ones like Scottie had to lay there and stare at the television, which was usually only soap operas. We decided that what they needed was the Disney Channel for those kids," McPhail said.

In the fall of 1985, the McPhails decided to donate the service to the hospital in Scottie's memory, but a visit to the local cable company put that dream on hold. Cox Cable of Oklahoma City informed the McPhails that the service would be \$1500 a month, according to McPhail. It was shortly after that time that someone sugges-

ted the satellite dish solution to the McPhails.

Ironically, McPhail, who is an employee of Southwestern Bell in Lawton, Oklahoma, had considered starting a satellite receiver dealership several years ago but had cancelled the plans when his son's illness was diagnosed.

McPhail pitched the idea to his fellow Communication Workers of America Local 6009 and the vote to fund the project was unanimous. These same co-workers had earlier provided more than \$1500 in support towards Scottie's medical expenses to help supplement insurance payments.

McPhail selected a 10-foot MA/Com dish with a T-2 receiver and actuator from a Lawton dealer who gave it to the group at cost. The system was delivered to the hospital on December 17 and hospital maintenance men donated their time on Christmas Eve to install it on the hospital's roof. "They called me on Christmas Eve and told me it was in. It was a nice present," McPhail said.

Danny Cavett of the hospital's chaplain's office called the gift a welcome change. "What it means is that the children don't have to watch the soaps. Some get addicted to them, even the little ones. And I'm not so sure it's good for their morale," he said. Cavett added that the state's current tight budget would not have allowed the hospital to purchase the unit.

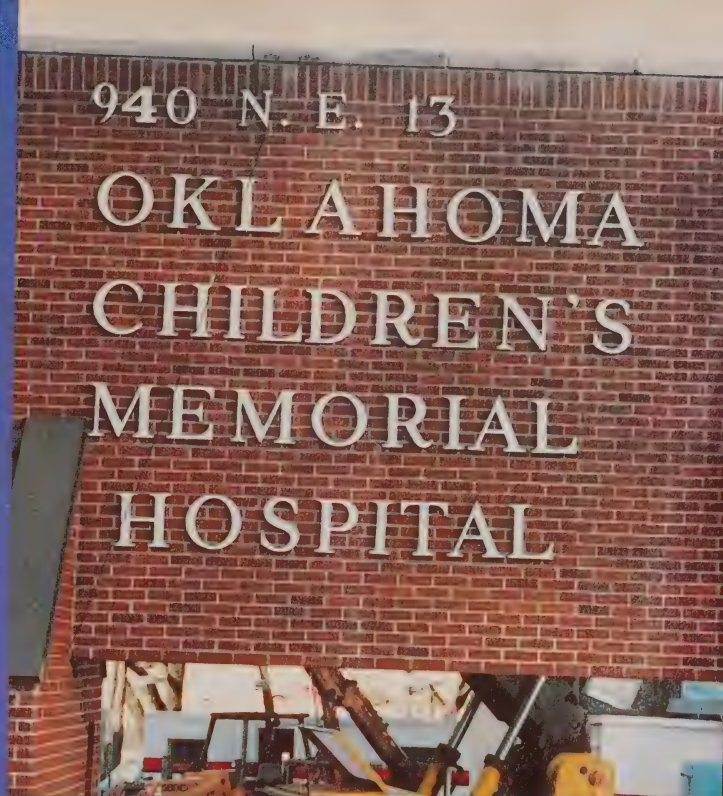
McPhail said that the multitude of television sets in the hospital posed no problem. "We went through the hospital's head end equipment and simply had to find one vacant channel to run the dish's programming," he said. Currently, the receiver is tuned to the Disney Channel.

With his initial goal realized, McPhail and his wife have set their sights much broader. They now want to see a satellite receiver installed at each of the children's hospitals in the United States—a total of 100 in all, according to McPhail. He is currently getting a mailing list of all such institutions and writing them to see which need dishes and which already have them. He is hoping that manufacturers can be persuaded to donate equipment or that Communication Workers of America could "adopt" a hospital in their area and purchase the equipment.

Looking to the future, McPhail is
Continued on page 59

Treatments made easier - When cable TV wanted \$1,500 a month, volunteers donated a satellite system to children at Oklahoma Memorial Hospital. Now they can watch the Disney Channel during their chemotherapy.

Photos by Randal Vanderveer



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Deserving from page 56

hoping to convince the Disney corporation to donate descramblers to each of the hospitals. "It would be a perfect marketing strategy for them. These kids sometimes stay for weeks or months and when they go home they are going to want that service," he said.

Scottie McPhail died before his hometown of Lawton got the Disney Channel, but shortly before his death he did get to fulfill a life-long wish of a trip to Disney World. "When they told us there was nothing else they could do for Scottie, we took a quick

trip to Disney World. He died 18 days after we returned," McPhail said.

When their experience was over, the McPhails were hesitant to return to the hospital. "At first I couldn't go back, but I decided that if the doctors and nurses could deal with sickness and dying on a daily basis, then I would do whatever I could to help," Mrs. McPhail said.

And if the McPhails have their way, no child will have to battle boredom and disease at the same time. "I know what those kids are going through, just sitting there day after day just watching their I.V.s drip into their arms. I want to give them something to smile about," McPhail said.

Donated TV Signal - Preston and Shirley McPhail, along with Local 6009 of the Communications Workers of America, donated a M/A-Com 10-foot roof-mounted mesh dish—signal went to each patient's room.



WHAT CAN YOU DO TO HELP?

Contact Curtis McPhail by writing 38 West 49th Street, Lawton, Oklahoma, 73505. He will tell you of a hospital near you that is in need of a dish or accepts contributions toward purchasing a dish for a hospital in need of one.

Contact your dealer. Ask him if he wouldn't consider donating a dish to a hospital in your area. The gift would be tax-deductible to the dealer and a morale booster to the children.

Contact your state representative. See if he or she would be willing to support appropriating a modest sum for a satellite dish at a state-owned children's hospital. Remind him that laughter is good medicine and good medicine could save the state some money.

Contact the local media. The arrival of the satellite dish in this story was front page news in the largest paper in the state. Publicity like that could get several donations.

Contact the Disney Channel. Write them at Walt Disney Productions, 500 Buena Vista, Burbank, California, 91521, and let them know that you would like to see them donate descramblers to these hospitals when they begin scrambling their signals.

Contact your local Communication Workers of America union and tell them what Local 6009 in Lawton, Oklahoma did. See if they could do the same for a hospital in your area. ♠

You return from the kitchen with your favorite beverage and bowl of popcorn and snuggle down in your favorite chair. The big game is next or the movie you have wanted to see for the last month. Your television screen brightens, but there is no picture. No picture! Oh no, look out dogs and kids and cats, he has no picture. You frantically dial up your local TV-RO dealer, but get a busy signal. You continue to power dial. Your finger is starting to blister. Your wrist starts to cramp. Time is slipping away, away, away...

The next day you peer out of the window as the van with Fred's Fine Satellite Service painted on the side slowly disappears. You sadly glance down at the bill he has left. How embarrassing. Thirty dollars for a service call to replace a blown fuse caused by a loose wire. It took the guy five minutes to fix it. The pain of it all. If you only would have known how to look for what the serviceman was looking for, you could have saved thirty bucks.

Did you ever have one of those experiences? It happens more often than you can believe out here in the land of the electronically unschooled. There are some ways to troubleshoot your satellite system without special tools, though. Bear with me if some of those ways seem rather elementary, but it's amazing how often the quick fix is overlooked. Imagine how much personal satisfaction you will derive from the process of discovering that your receiver hasn't melted, it's just honey from the "Chicken McNuggets" that your kids spilled. Much of the quick fix process is one of elimination.

Let's begin with trouble in your picture. Is there a picture? If there is, what does it look like?

- 1) If it is fuzzy such as shown, check the following:
 - a) Make sure you are on satellite, move the dish manually with the actuator a little bit to the east a little to the west. If it doesn't change, get the best picture you can and try the polarotor.
 - b) If the picture doesn't clear up or change, check the cable connections behind the receiver.
 - c) Wiggle the wires while you watch your screen. Does the picture change? Do you get lines through the picture? If you get interference as you move the wires you may have a bad connection.

TROUBLE SHOOTING YOUR TVRO

*You'll Save Time And Money
When You Isolate Your Problems*

- d) Check the fine tune on the receiver
- e) Turn off the receiver and unscrew the cable from the receiver and check the "stinger" (the little wire that sticks out from the middle of the connector) to make sure there is nothing on it, because a little bit of anything on that stinger will cause a problem.

2) If your picture is faint, but the colors are there, check the A/B switch. Run it back and forth to make sure there isn't something wrong with the switch. Make sure you are on the correct channel to receive the signal. Sometimes being on channel three when you should be on four or vice versa will give you that type of picture.

3) If you get a totally black screen, it may be your modulator. One way you can check this is to hook the receiver up to a VCR or a TV monitor. You just run direct from the audio and video ports in the rear of the receiver to the VCR or monitor. If you get a picture then, it's more than likely the modulator.

4) If the receiver does not come on, check to see that it is plugged in (don't laugh, it happens). Check the fuse.

5) If you are getting a picture, but it is scrambled or not appearing right, check that the normal/invert switch is in the right position and that the scan button is off. Another little button that can throw you a curve is the AFC. It's a key element in some receivers to have off when you tune them. Two examples are Luxor and STS.

If you have eliminated the receiver as the problem and think it may be the polarotor, there is a way you can check it, assuming it is a mechanical type and

not a ferrite. Simply go out to the dish and have someone inside go from odd to even on the receiver or on the polarotor switch. If you are able to observe the probe then watch to see whether it moves or not. If you can't see it, then listen because you should be able to here it click from one side to the other or you can hear the motor run.

If you are the real adventuring sort, you can remove the polarotor from the dish, take it inside and hook it to the receiver and watch to see if the probe moves.

There is no easy way to check to see if the LNA is bad except by substitution. Take your LNA into the dealer or to a friend who has a dish and substitute your LNA for theirs. If it works on their system then something else is wrong.

If your actuator doesn't actuate, there are a few steps you can take to check it out. The very first step is to check the fuse in the controller. If it is not the problem, then make sure all the connections are secure and that there are not any loose wires. Go outside and look at the jack. Is it all the way out or all the way in? Have someone tap the controller both ways. Do not, I repeat, do not hold down on the controller.

If you can hear the motor run or try to run, but the jack doesn't move, then it's possible that the jack is stuck. Un-

Continued on page 80

Fuzzy, faint or lines? *If you have these picture problems, don't first run to an expensive service call. Home remedies can often solve the problem—with a bit of patience, ingenuity and instruction.*



Ku BAND CHECKS IN



BY PETER SUTRO

On September 1, 1985, the most ambitious Ku-Band project to date was launched with the up-linking by HI-NET Communications of the Showtime, ESPN and CNN Headline News services to the G-Star I satellite. This appears to be a more ambitious project than NBC's migration from C to Ku-Band's SBS 2 satellite because it is limited to NBC and its affiliates whereas HI-NET Communication's project is targeted at every hotel property in the continental United States of 100 rooms or more. In fact, HI-NET Communication's projections are for 1,750 installations by the end of 1986 and 3,000 by the end of the decade.

The history of premium television in hotels (whether free-to-the-guest or pay-per-view) goes back to the early 1970's when such companies as Spectradyn and First Cine-Tel Communications Corp. experimented with providing first-run movies to their guests using 3/4" video tape machines. Holiday Inns, Inc. was one of the pioneers in the use of this technology but it proved too cumbersome, expensive and, worst of all, unreliable, causing guest dissatisfaction. In the late 1970's with Home Box Office, Showtime and The Movie Channel broadcasting from satellite, these packagers negotiated contracts with the film studios to allow them to deliver their product to hotels on a free-to-the-guest basis. For this the packagers and ultimately the studios received a fee based on the total number of rooms in the hotel, whether occupied or unoccupied.

Again, Holiday Inns, Inc. was in the forefront of this new technology and, through its subsidiary, HI-NET Communications, it made available to its hotels C-Band satellite systems which enabled them to receive the programming of Home Box Office and to make it available to its guests as a free amenity. In those days HBO went on the air at 5 PM and made their transponder available for teleconferencing during the rest of the day. This represented an additional service and source of revenues for Holiday Inns, Inc. until, in early 1981, HBO went to a 24-hour schedule and HI-NET Communications had to look elsewhere for its teleconferencing transponders.

During this period both Showtime and The Movie Channel were soliciting hotels to use their services and ESPN, CNN and a few other programmers were also available for

a monthly fee. As the cost of commercial grade earth stations and the electronics which enabled the hotel to offer these amenities dropped under \$10,000, more and more hotels signed up to receive these programs.

Unfortunately, many fly-by-night motels and even some large hotels affiliated with national chains, took advantage of the unencrypted nature of these transmissions and installed TVRO's in order to receive, without authorization, everything from movies, sports, news, adult entertainment and even the sacrosanct blacked-out football games on the major TV networks. Threats of law suits were largely ignored by the violators and the programmers were reluctant to go to court as it was hard to prove just which services were being pirated. In the case of a successful prosecution and conviction, judges generally handed down a cease and desist order or, at best, a symbolic slap-on-the-wrist fine. The risk of an unsuccessful suit would represent a very dangerous setting of precedent.

The programmers chose to take a different tack by concentrating their efforts on developing a system of secure scrambling of their signals to prevent their unauthorized interception. They felt that this would effectively shut off these illegal hotels and motels as well as a large number of apartment houses and condominiums which were helping themselves—illegally—to their services. Then, with the possibility of piracy denied them, it was felt that they could be turned into law-abiding customers and an income derived from them.

All this was happening at C-Band and HI-NET Communications had peaked at 375 installations. One of the main drawbacks to C-Band was the presence of terrestrial interference at many of Holiday Inns, Inc.'s most important locations, especially in the cities where teleconferencing services were most sought after. But we were now in 1984 and Ku-Band satellites were finally becoming a reality. Here was a technology which offered the possibility of installing virtually all the Holiday Inns, Inc. properties in the continental United States so that a nationwide teleconferencing network could be established. Not only that, but the possibility of transferring huge amounts of telephone traffic and data via satellite offered Holiday Inns, Inc. the oppor-

A New Satellite Network Aimed At Every Hotel In The U.S.



Holiday Inn - It's advanced to the forefront of satellite technology by moving to establish its own Ku band network.

tunity of reducing these multi-million dollar yearly budget items dramatically. Room reservations could be made and confirmed via satellite and information on inventories, food and beverage needs and other data could be passed between each property and the Holiday Inns, Inc. corporate headquarters in Memphis and vice versa. In order for these opportunities to be realized it was necessary for the hotels to have a Ku-Band antenna equipped to receive *and* transmit satellite communications.

In order to accomplish this Holiday Inns, Inc. enlisted the aid of Comsat General Corp. who now owns 50% of HI-NET Communications. Comsat General has contributed not only half the equity in the new venture but also its vast expertise in the satellite area. The task was to find the right satellite, the right ground equipment, the right encryption system and the right programming and to put them all together into one coherent system to make the whole plan work. The obvious choice of satellite was the recently launched G-Star I satellite orbiting at 103° West Longitude, almost equidistant from the East and West coasts of the U.S. HI-NET Communications then contracted with Showtime, ESPN and CNN Headline News to be the primary suppliers of free-to-the-guest programming (Biznet and WTBS are used as daytime fillers on the fourth transponder). It only remained to choose the supplier of the ground segment of the hardware and, most importantly, an encryption system to be used to protect all the transmissions, be they free-to-the-guest, pay-per-view, teleconferencing, telephone or data. After many months of testing the choice of encryption systems came down to MA/Com's Videocipher (already espoused by HBO, Showtime, CBS and many others for their C-Band signals) and Scientific Atlanta's B-MAC system which had just been adopted by Australia. Scientific Atlanta had already won the contract to supply the antennas and now they won an even greater triumph by being awarded the encryption contract plus the contract to supply the in-room program selector box which is attached to each TV set. These program selectors enable the guests to view regular TV, switch to the free-to-the-guest programming or to "Satellite Cinema" on a pay-per-view basis.

It is on this last service that the economic success of the enterprise rests because the income derived from it must go a long way towards defraying the cost of the entire project. Here's how the economics work assuming for the example a hotel of 200 rooms. The hotel signs a 7 year contract with HI-NET Communications agreeing to pay \$5.00 per room per month or \$84,000 over the life of the contract (there are provisions for some cost escalation). For this HI-NET Communications installs and maintains the entire hardware package and pays the cost of the programming for the life of the contract.

The pay-per-view channel "Satellite Cinema" is designed to show two first-run movies per night at a cost to the guest of \$5.75 each and an adult double feature for an additional \$5.75. These revenues go entirely to HI-NET Communications for the first 390 uses per month (an average of 13 uses per night) or a total of \$2,300 per month. Over that, the hotel receives credit for 20% of the revenues generated. That means that if 1,260 pay units are ordered in a given month a 200 room hotel breaks even against its \$1,000 programming cost. Anything under that and the free-to-the-guest amenity has cost them money; anything over that and they show a profit. HI-NET Communications in this same hypothetical month of 1,260 uses would receive as its share of these revenues \$6,245. Assuming that half this gross must be remitted to the film studios it is still a vast sum when multiplied by the 1,500 Holiday Inns plus any other hotels who choose to sign up with HI-NET Communications. The gamble is whether the guests will be so satisfied with watching free programming on Showtime, ESPN and CNN as well as the regular network channels that they will not opt to pay \$5.75 for such films as "St. Elmo's Fire," "Explorers" and "Death Wish II" or such adult fare as "Last Tango in Paris," "Goodbye, Emmanuelle," and "Felicity."

Needless to say, the dollar swings can be very wide and the gamble very big, but if enough people "pay-per-view" the rewards for Holiday Inns, Inc. will be enormous. Not only will they have created a money machine but they will have built the world's largest teleconferencing network and an unparalleled telephone and data transferral system. ▀



Why The Dishes?

They Look Weird, But There's Sound Reasoning Behind Them

BY JIM VINES

Item: In the early 1950's military radar designers discovered that offsetting the antenna's reflective surface had the dual effect of increasing its gain and its resistance to being "blinded" by unwanted sources of energy.

Item: In the early 1960's planetary astronomers discovered that by employing offset optical designs in reflecting telescopes, they could better resolve narrowly separated details and discern subtle low contrast detail (such as Jupiter's equatorial cloud belts) that previously eluded their practised eyes.

Item: Recently two manufacturers of home satellite TV antennas (Birdview Satellite Systems and Pico Products) introduced antennas that have been variously described as "radical" and as "accidents waiting to happen."

Is Birdview's "Spoon" something that got bent out of shape? Is Pico's "Kid" a cynical marketing director's device to hype sales?

The future may not be entirely here, but it's arriving. Two-degree spacing, that dreaded "virus of the space lanes" is being implemented across the Clarke Orbit Belt. And that new tower they're erecting over in the Smiths' cornfield? Yup, it's going to be bristling with microwave dishes by next week. In a couple of months when the system's "fired up," your conventional TVRO antenna'll be "blinded."

And all of those new satellites "up there" in 1988—packed together across the Clarke Orbital Belt just two degrees apart—will your small, *conventional* dish "see" them as blurred, continuous band of "4GHz light" across the southern sky? Or will your dish resolve the Clarke Belt into sharply distinct separate points?

Wierd dishes with strange shapes - *These two examples of offset antennas are designed to zero in on the signal when today's C-band satellites get closer together (2 degree spacing). Examples of high-tech engineering, they have been described as "spoons" or "accidents waiting to happen!"*

It seems that whenever a new design concept is introduced into the consumer marketplace it elicits suspicion or indifference.

Several HSTV readers have told this writer in so many words that they thought the new "offset" antennas from Pico and Birdview were the brainchild of some demented engineer who had blackmailed the corporate board of directors into underwriting a major boondoggle.

"Your recent article certainly cleared the air!" replied a TVRO industry insider from the West Coast who read this writer's article in an earlier issue of HSTV.

"Now maybe other antenna manufacturers will jump on the 'offset' bandwagon," said another industry insider.

Maybe, maybe not. Other industry pundits see little inclination on the part of most "consumer grade" antenna manufacturers to invest money in R & D, expensive tooling, and a complete marketing program only to "bomb out" in the marketplace. This young industry has already seen some brilliantly conceived product designs failed simply because of "timing."

Why did Chrysler's Airflow design fail in the automotive marketplace of the 1930's? And why, in spite of its many functional advantages has the geodesic dome failed to gain widespread acceptance in the homebuilding industry?

Because the Airflow didn't look like a car and the dome doesn't look like a house.

Hopefully, the next generation of antennas won't swoon in the marketplace until a horde of disillusioned home TVRO system owners (and dealers) find out why their pictures have turned muddy with adjacent satellite interference.

Hopefully the prospective home TVRO system buyer prides himself as being future-oriented. Hopefully dealers will have the same reception to new design innovations.

The buyer of an "ultimate" TVRO system, like the buyer of an "ultimate" audio component system wants and deserves state-of-the-art equipment. He wants his system to be "future-ready."

Buckminster Fuller wrote and said many times during his life as a designer and philosopher that technology is the "process of ephemeralization"—doing more with less. How is "offsetting" an example of "doing more with less"?

Consider two TVRO systems in neighboring backyards. In each case the dish has a "capture area" of about 27 square

feet. Both have equal LNAs—in this case 80° Kelvin noise temperature. The rest of the systems, i.e. cable length, type of cable, receiver, etc., etc., are all the same.

Except that one has a conventional 6 foot dish and the other uses a same size "offset" dish.

Time to trot out a couple of "TVRO system accounting formulas," with Plain English explanations. First, "System G/T 'figure of merit.'"—You're going to learn this even if it hurts! The G/T formula (where "G" is gain and "T" is temperature):

$$\text{System G/T} = G_{\text{ANTENNA}} - 10 \log (T_{\text{ANTENNA}} + T_{\text{LNA}} + T_{\text{OTHER}})$$

See, that didn't hurt any more than sticking six-inch hot pins through your eyes.

Now that the hurt is over you're probably asking "Why didn't you include the LNA's gain in the formula?"

Because the LNA not only amplifies what the antenna is supposed to "see" (i.e. the signal), it also amplifies that the system designer doesn't want it to "see." Noise. And that puts us back at Square One.

On top of that the LNA adds some noise of its own. That is included in our "accounting formula."

Now we'll plug some numbers into the G/T "accounting formula." Here we'll consider the system using the conventional antenna.

$$\begin{aligned} \text{System G/T} &= G_A (36.0 \text{ dBi}) - 10 \log (50^\circ \text{K} + 80^\circ \text{K} + 5^\circ \text{K}) \\ &= 36.0 - 10 \log (135 \text{ K}) \end{aligned}$$

Then we convert the "135° K" which is the total system temperature into an appropriate "10 Log" number found in "TVRO System Parameters" (Ref. Footnote #1). The "10 Log" value for 135° K is 21.3, which is subtracted from the antenna's gain (36.0 dBi). So, ...

$$G/T = 36.0 - 21.3 + 14.7 \text{ dB/K}$$

That's the performance level we'd expect from a system with a conventional 6 foot dish as its "eye," "looking" at a satellite located 40 degrees above the "thermal glare" of the Earth's horizon.

Now to repeat the formula but plug in the specs for a competently designed offset antenna of equal "capture area":

$$\begin{aligned} \text{System G/T} &= G_A (37.0 \text{ dBi}) - \log (18) \\ &= (37.0 \text{ dBi}) - 10 \log (18 \text{ K} + 80 \text{ K} + 5 \text{ K}) \\ &= (37.0 \text{ dBi}) - 10 \log (103 \text{ K}) \\ &= (37.0 \text{ dBi}) - 20.1 (10 \log \text{ value for } 103 \text{ K}) \\ &= (16.0 \text{ dB/K}) \end{aligned}$$

By now the "pain of learning" has been numbed enough for us to ask what's so great about a mere 2.2 dB/K improvement. Isn't "16.9" only about 15 percent more the "14.7"?

It is not. Because the decibel (dB) is a logarithmic expression, the seemingly modest 2.2 dB/K added to the system G/T by way of using an offset antenna describes what amounts to a 50 percent improvement.

The system G/T improvement of 2.2 dB/K translates into an equal improvement in FM carrier-to-noise ratio (CNR). The average receiver has a CNR threshold of about 9 dB, below which those proverbial sparklies start cluttering up the video. (With bright reds, hot pinks—and other iridescent collors, a CNR of about 11 dB is needed for total elimination of sparklies.) So, when CNRs are already below 9dB, a loss of 2.2 dB can be very annoying.

The "G/T performance gap" between the conventional and the offset systems dramatically increases at lower look angles. For example in Worcester, Massachusetts Galaxy One's "look angle" above the horizon is approximately 12 degrees. The G/T's for the conventional and the offset systems are 13.2 and 16.5 dB/K, respectively; for a spread of 3.3 dB/K.

Time to renew the "pain of learning." Because we will now consider how good the video will be for our pair of neighboring TVROs if they are located at a "high look angle" site (San Diego). Vital statistics for San Diego (32 50'N, 117 10'W):

Galaxy I look angle	49 degrees
Satcom F3R look angle	47.5 degrees
Galaxy I signal strength	36-38 dBw
Satcom F3R signal strength	32-36 dBw

Now we'll trot out another TVRO system performance "accounting formula."

$$\text{CNR} = \text{EIRP} + \text{System G/T} - \text{"Path Loss Factor"}$$

For both Galaxy One and Satcom F3R the conventional and offset system G/Ts will be 14.8 and 16.9 dB/K, respectively. The CNR for a "high output" transponder on Satcom F3R, for the "offset" system:

$$\begin{aligned} \text{CNR} &= 36 \text{ dBw} + 16.9 \text{ dB/K} - 41.6 \text{ (derived from} \\ &\quad \text{45-50° look angle and a receiver "I.F. bandwidth"} \\ &\quad \text{of 25 MHz)} \end{aligned}$$

$$= 11.3 \text{ dB}$$

Since the conventional system's G/T is 2.1 dB/K below the offset's, the resulting CNR will also be 2.1 dB less; or 9.2 dB. For a 32 dBw transponder the CNRs will be 7.2 dB and 5.1 dB respectively for the "offset" and the "conventional." At 7.2dB the offset system will have annoying amounts of sparklies; while at 5.1 dB the conventional system will be "out to lunch."

Worse, while our friend in San Diego with the conventional system tries to watch Satcom F3R, he is likely to find a *non-random* pattern of sparklies super-imposed over the varying levels of random sparklies already present. This is the "washover" from that nearby "floodlight in the sky," Galaxy One. Across the continent along the East Coast the situation is more serious owing to the reduced "parallax angle" between Galaxy One and Satcom F3R.

In San Diego, Galaxy One will render CNRs of about 10.3 and 12.4 dB on average for the conventional and offset systems. The story up in Bangor, Maine is decidedly different, particularly for the conventional system. Bangor's vital statistics:

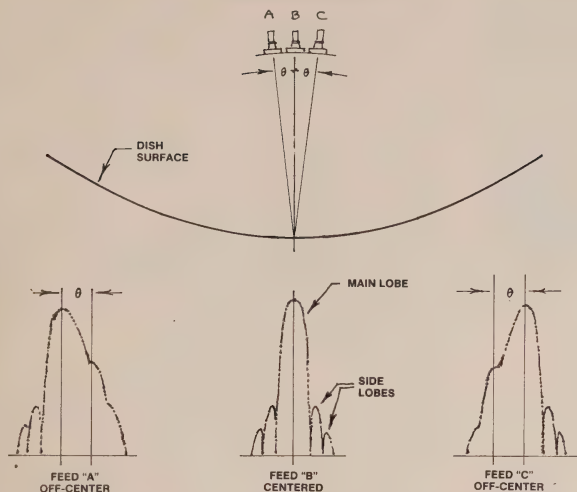
Galaxy One look angle	9 degrees
Galaxy One EIRP signal strength	35-37 dBw

Now, the relative performance of both systems aimed at Galaxy One, in Bangor, Maine:

	System G/T	Receiver CNR
"Offset" system	16.4 dB/K	9.4-11.4 dB
"Conventional" system	12.7 dB/K	5.7-7.7 dB

Will the "conventional" system "Boogaloo in Bangor"? In a word, the answer is no. And that's before we start to consider the dreaded "adjacent satellite interference."

Readers wishing to learn more about how the antenna determines TVRO system performance are welcome to write to Jim Vines at P.O. Box 448, Monee, Illinois 60449-0448. Vines can be reached by phone at 312/534-0889. A



Avoiding interference - Off axis feeds (A and C) produce larger side lobes which are signals coming from adjacent satellites. Dual feed is the solution.

The Offset Ku Conversion

The Unique 12 GHz Challenge

BY JIM VINES

There are several problems associated with converting any TVRO antenna to Ku-band reception. Those problems also apply to offset dishes.

Surface accuracy. What is adequate for today's C-band reception may be too "sloppy" for Ku-band work. At 12 GHz, Ku-band requires *three times* the surface accuracy required for 4 GHz C-band use.

Surface rigidity or shapeholding. As most dishes are swung across the Clarke Orbital Belt, they flex a little. This is because gravity acts differently on a dish as its "look angle" is varied. Then there is windloading. One way or another, most consumer-grade dishes will flex a little, either due to wind or gravity. At 12 GHz, the degradation effect for a given amount of dish distortion will be *nine times* as great as it is at 4 GHz.

The non-symmetrical design required for offset antennas adds to the problem of surface deformation. But there

are ways to solve the shapeholding problem, although they haven't been thoroughly explored yet.

Fortunately, the Ku-band satellites have substantially higher output transponders. Higher power transponders, together with more concentrated "spot" beams, result in vastly higher signal "footprint" values back on Earth.

The higher output from the Ku-band satellites makes it possible for a reasonably good 10 or 12 foot C-band dish to function adequately if it is *carefully* retrofitted with a Ku-band feed.

Carefully?

Carefully focused and carefully centered. Because slight defocusing or decentering of a Ku-band feed will degrade dish performance far more severely than the same amount of "detuning" would degrade dish performance in the C-band.

Dual band feeds of the "piggyback" variety really are just separate C and Ku-band feeds harnessed together, side by side. If you position the C-band feed

at the dish's centerline or optical axis, then the Ku-band feed is a good 4 inches off center. With a 10-foot dish whose focal length is 3 feet, decentering a Ku-band feed by 4 inches is the functional equivalent of moving the C-band feed 12 inches off-axis. That's not too swift.

Ok, let's center the Ku-band feed and move the C-band feed 4 inches sideways. Does that degrade the dish's C-band gain? Not very much, in most cases, less than 1 dB.

However, before decentering the feed can seriously degrade the antenna's gain, another problem raises its ugly head: sidelobes. (Ref. Diagram 1) In the near future world of two-degree satellite spacing, it is imperative that your TVRO antenna "see" only the satellite it's aimed at.

The answer, obviously, is a true dual band feed, where one opening is used for both 4 and 12 GHz. Other compromises may be introduced but they will be less consequential than the ones already discussed. At any rate, even the best-engineered designs from airplanes to antennas are always a set of compromises.

There is at least one source of true dual band feeds: Seavey Engineering Associates, located in Cohasset, Massachusetts. Phone 617-383-9722.

Aiming. If you think aiming a 4 GHz dish is an exercise in precision, then you're in for a real shock at 12 GHz! Once aimed, *staying* on target at 12 GHz is the next challenge. Assuming your 10 foot dish has the surface accuracy to really play well at 12 GHz, it will be up to three times as directional at 12 GHz (as at 4 GHz).

For an 8 or 10 foot dish to "track" reliably and accurately, a rigid, backlash-free mount and actuator system are required. You would gasp if you knew the names of the companies that are waiting for my assistance in designing a complete offset antenna/mount system to function at both 4 and 12 GHz. I say *system* because you can't design the dish and then design the mount afterward, as an afterthought.

I'll leave you with this thought. There is the cost of buying a TVRO antenna (or receiver, etc.). And then there is the cost of *owning* it. If you've followed me this far, you probably understand the difference between the two types of cost.

NOTE: If you have a question to ask or an experience to share about conventional or offset antennas, write a short note to Jim Vines at P.O. Box 448, Monee, Illinois 60449-0448. ✉



Ted Turner - Appearing before a TVRO trade show crowd in 1983—he owned one of the first private TVROs in the world.

Buyer Beware from page 25

There are several world-wide agreed-to satellite frequency bands. Our present satellites, operating at something called C band, are but a tiny sliver of the potentially awesome 2,000 channel plus service of 20 or 30 years hence. After C band, the next frequency band of interest is something known as Ku band. That's the new frontier of satellites. For builders and owners and operators of satellites, the blush is gone from the C band rose but Ku promises huge profits for *some* early entrants. RCA is one of those.

Late this past December, RCA and Home Box Office made a joint announcement. They said that Ku-3, the third in a series of Ku band satellites being built by RCA, would be jointly owned by HBO and RCA. There will be 16 channels or transponders on this (to be launched in) 1988 satellite. HBO says that all 16 channels will be used for cable TV service. They also say they will be transferring their own program channels to Ku-3 and they will, with RCA, invite other cable programmers to join them there.

The satellite dish you now own, and its parts; the satellite receiver you now own, and its parts, *will not* receive these Ku band transmissions. You may, or may not, be able to adapt your satellite system to Ku band. You may determine that it will be cheaper and better for you to purchase an entirely new TVRO terminal system just for Ku band.

If Ku band was originally conceived as a frequency band for 'DBS,' or direct-to-home transmissions, why would HBO be planning to move its cable service channels away from C band to Ku band. Isn't C band better suited to cable systems?

And won't HBO, using the superior delivery abilities of Ku band, be sending their programs to individual homes using the new Ku-3 satellite? Not according to HBO which very pointedly said in their December press release:

"HBO currently plans to offer its service to home TVRO owners only through C band satellites as outlined in our C band direct program."

That does not sound like HBO plans to be in the Ku band home delivery system. However, the best business plans change with the times and there are already suggestions that RCA Service Company, an arm of RCA with a fleet of service trucks and technicians nationwide, is planning to offer home TVRO installation, service and descramblers very shortly. HBO, one half of the partnership between RCA and HBO, could be good to its word and not offer Ku band terminals to home viewers. RCA through RCA Service Company, on the other hand, might well be in that business shortly.

So now we have yet another element to the myriad of problems facing the home TVRO user; Ku band as a potential replacement for C band. HBO is not the only cable related firm researching Ku band possibilities for home scrambled programming delivery; several other firms have indicated interest in doing precisely the same thing.

The primary difference between C band and Ku band is as follows:

- 1) Antennas should be smaller; down to 3 feet in size and sel-

dom larger than 6 feet. This means quicker, more compact installations at probably lower cost per system.

- 2) There is no existing 'universe' of Ku band receivers; a firm such as RCA Service Company could walk in and offer a brand new 'virgin' sales, marketing and installation plan which would not be troubled by an existing family of some 1,500,000 dish installations.

- 3) There is no 'pricing history' for Ku band home terminals. New pricing for both hardware (systems) and software (programming) can be created. That means added profit for hardware, and probably reduced 'package pricing' for the software.

So what impact is the 1988 scheduled launch of Ku-3 likely to have on TVRO? Considerable. And between now and 1988, the recently launched Ku-1 satellite is to be used for tests of the Ku band service. In fact, a home Ku band service promoted by RCA Service Company (or another firm) could be in the offering early in 1987.

AT THE VERY LEAST

Even if you are an astute reader and a student of the TVRO scene, some or much of what has preceded is going to be confusing to you. This is a very complex issue and some of our conclusions defy normal American business practices and are therefore difficult to accept. A summary is in order at this point. In my opinion (I get to phrase it in this way because this is an editorial opinion):

- 1) Cable programmers for now are reluctant sellers of a product; television programming.

- 2) They have the freedom, at the present time, to select a pricing schedule which pleases their existing customers, the cable TV system operators.

- 3) They also have a very strong legal and moral position; they do own the programming in question, and as the owners of that programming they have certain right to sell or not sell that product as they see fit.

- 4) The home TVRO industry has surprised many people by its growth rate and more recently by its ability to sell in suburban and urban markets. This 'march into the cities' is threatening cable's strongest markets and cable is reacting like a cornered rattle snake. Everything is fair in love, war and business.

Caught in the middle in this range war are at least two groups; the people who build and sell TVRO systems, and, the people who have purchased a TVRO system. Those who build and sell TVRO systems are the most vulnerable link in this chain because they are at best poorly financed and least able to withstand a prolonged drought. It has been estimated that in a normal year, when business is good, nearly 70% of all new TVRO dealers fail before their first anniversary. In recent months, that number has shot upward with perhaps 90% of all new dealerships failing before the first birthday.

In a word, business has dropped off dramatically, leaving as many as several hundred thousand C band terminals in the distribution pipeline and not moving. The most optimistic forecasts are calling for TVRO sales during the first six months of 1986 to run along at about 50% of the 1985 levels. The consumers who would buy a TVRO (you, if you have been considering it) are simply not buying as had been expected. *And that hurts.*

First, it hurts the people who produce the equipment because their entire flow of products and materials has been based upon projections that are now not happening. The very nature of TVRO producers from the very beginning has been entrepreneurial. These firms have financed their own growth by plowing earnings back into expansion of production space, test equipment and raw parts to keep that growth going. The marketplace has been all 'up' for five years. Now with a tremendous suddenness, it has turned down and that is leaving many of the equipment producers without the financial reserves to hang on. Many had predicted a 'house cleaning' in the supplier ranks; few expected it to happen quite so suddenly or with such fury.

How does this affect the would-be TVRO buyer? Let's turn positive for bit.

- 1) Prices, for as long as the surplus of equipment lasts, will never be lower. To bail out of tight financial problems, original

Continued on page 70

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Dealer trainee schools - They began sprouting last year. This one was held by distributor, SVS in Catskill, New York in 1984.

Buyer Beware from page 68

equipment manufacturers, distributors and even some dealers will be holding on by moving equipment out at cost or just above cost. *That is a buying opportunity for the consumer.* The best profit structures have always been in the more complex systems selling for over \$3,000. As a buyer, you should be able to save big bucks (perhaps 30% and more) on these top-end systems *starting right now.*

Present TVRO owners likewise should consider this an ideal time to trade older equipment for newer, more sophisticated equipment.

2) *Scrambling.* Ultimately, a significant share of the most popular channels will scramble. *That in no way should detract from the appeal of owning a TVRO system* because for every channel that may scramble there will be six that do not. You will find no shortage of unscrambled programming to watch.

Additionally, descramblers are now available. If price is no object, or you feel no emotional involvement to paying more for satellite programming than cable subscribers pay for the same programming delivered via cable, you can buy virtually everything that is scrambled for a monthly fee.

3) *Ku Band.* It is coming but not as soon as you may be told. *I wouldn't worry about Ku band service* being available or attractive much before 1988. There simply will not be the satellites available to support a good mix of Ku band programming much before that date.

Ku band service today is about where C band service had grown in 1978; it is all very new, the system equipment plus the programming to make the hardware interesting is just not there, yet.

4) *Equipment compatibility.* Here is the most dangerous area of all. If you are hoping to someday add a descrambler to your C and TVRO terminal, the receiver you select must be capable of interfacing to the Videocipher descrambler. A man desperate to sell you a system will tell you almost anything to make the sale. *Insist* that you talk with or meet somebody who has bought the same receiver and a descrambler to verify that compatibility. Or, carefully inspect the demonstration system in the dealer's store to be sure that the receiver you are selecting will work with the descrambler unit.

As an added bit of insurance, if you are buying a descrambler initially, withhold a sizeable part of the final payment for the system until you have your descrambler, it is hooked up, and it is working. The process is very simple:

A) The descrambler comes out of the box and plugs into the appropriate jacks on the receiver.

B) Using an 800 number, packed in with the descrambler proper, you call a service center (ie. HBO) and give them the serial number from your descrambler, your name and address, and your VISA/Mastercharge card number.

C) Within 30 minutes time (usually far less), your pictures unscramble and you are watching HBO (and/or Cinemax).

When you reach that point in your installation, it is safe to assume that you have purchased a compatible receiver and descrambler. Pay the dealer.

SYNOPSIS

Yes, these are troubled times. But as with virtually any troubled period, there is a business and consumer opportunity window here which can save you significant money in the purchase of your TVRO system.


At the same time, there is also a period of time where many of the so-called business and technology pioneers will be leaving the TVRO industry. From the consumer's point of view, the lure of a bargain must be carefully balanced against promises of continuing service and parts availability for any equipment now in the field. In the relatively short life span of TVRO to date, we have already seen dozens of manufacturers enter, and leave, the TVRO marketplace. Of the estimated 1,500,000 terminals sold to date, it is my belief that no fewer than 10% of those systems are already unable to receive factory repair or parts when they break because the supplier is no longer in business. *This number is liable to escalate rapidly during 1986* and the consumer with significant dollars invested must protect himself or herself against *bargains* which may turn out to be not bargains if repair or repair parts become impossible to acquire.

Proper knowledge (which equipment is safe to buy, where to obtain repair assistance or repair parts) becomes an important, new ingredient in the TVRO consumer equation. Is there a ready source for such information at this time? As the 'father' of TVRO, I have given this problem a great deal of thought, trying to create some low-cost system which would allow the consumer to buy with confidence at a time when rapid changes in the marketplace are so rampant. I may have the answer.

In the process of producing the TVRO industry's original trade journal (*Coop's Satellite Digest*) each month, we routinely survey the operational status of most of the suppliers to the industry. This information is frequently reported in *Coop's Satellite Digest* where dealers, distributors and other insider people and firms are alerted to the status of the firms and products available within the industry. It is the nature of a trade publication of purposefully limited distribution that much of this material never leaks down to the retail or consumer level. That's a pity since the consumer stake in all of this is by dollar measurement the greatest of all. How can this information be made more generally available at reasonable cost?

The answer.

Coop's Satellite Digest has prepared a special review of the status of the various equipment suppliers as of the date of publication. We call it *CSD TVRO Consumer Review*. This is the insider information all consumers need to make intelligent buying decisions concerning TVRO equipment, including descramblers and descrambling equipment. A box insert here tells you the categories of material routinely reported in the *CSD TVRO Consumer Review*. Ordering instructions for *The Review* are also found in the box. In addition to this low-cost material, we have also established a 24 hour per day CSD TVRO Hotline telephone service which and scrambling. There is no charge for this service other than the normal long distance charges from the telephone company. At the normal long distance charges from the telephone company. At the end of each telephone Hotline report is an announcement telling you when the next updated Hotline report is anticipated. In this way you can routinely check-in with the Hotline service and stay current with the rapid changes in this unsettled world during 1986.

This has been a very difficult report to prepare because it was potentially filled with many negative conclusions. Information, accurate information on a timely basis, is always valuable in any field of endeavor. For the next year in the TVRO field, accurate information will be imperative. These are evolutionary times where one established technology (cable television) is being threatened by a new technology. Business people in both fields have huge sums of capital at risk in varying amounts. It is our belief that ultimately TVRO's place in the sun will evolve into a peaceful, supportive posture right along side cable, broadcast television, and even newspapers. TVRO is really nothing more than a new, efficient system of information delivery. As this maturing process takes place, individual consumers with between \$1,000 and \$7,000 invested in their TVRO terminals represent the ultimate 'at risk capital.' *The element of risk for the consumer is our concern here.* 

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Much easier to understand than a do-it-yourself book, this film has an added advantage... saving money. By becoming thoroughly knowledgeable before you invest in equipment, you'll spend your dollars in the right places. This cassette was originally designed to instruct dealers in the correct installation of TVROs, so you can learn the same way the experts learn, the correct way.

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Fighting The TREES

You've Got To Get Above Them For Proper Reception

BY TIM HARRINGTON

There is one absolute requirement for the proper operation of a satellite TV system: the dish must have an unobstructed view of the satellites in order to receive programs from them. Some people who decide to buy a satellite TV system find that their property contains one or more obstructions, such as tall trees or buildings, which make it impossible for a ground mounted dish to get a clear view of the southern sky where the satellites are located.

There is a solution to this problem and that is, of course, to get the dish mounted high enough to clear whatever is obstructing its view. Although a satellite dish is a rather large and heavy object, it is not as difficult a challenge as you might think.

The following are four basic approaches to installing a dish higher than a standard ground mount:

Building-secured tall pole mount
Free standing tall pole mount
Roof mount
Tower mount

There are some other good reasons for having your dish mounted on a tall mount such as installations at sites with limited or no yard space, improving security and sometimes, believe it or not, for improved appearance.

Some residences and, for that matter, offices have very limited or no yard space. In these cases a tall pole mount or roof mount is the only alternative. Even if there is plenty of room in a yard, some people feel there is no reason to waste it on a satellite dish when it can be mounted up and out of the way.

While it is true that in many cases an elevated mount will tend to make a dish more noticeable, there are some cases, such as mounting a dish on a tall pole on a small strip of property on the side of a house, where it will actually be less visible both from the front and the back of the house. Keep an open mind when considering a site for your dish. You may be surprised what you come up with through a little creative thinking.

Security is another consideration important to some dish owners. An elevated mount will make it much more difficult for thieves to steal all or part of the exterior portion of the system. Satellite dishes sometimes present an appealing and interesting target for vandals and it is, of course, much more difficult to vandalize an elevated dish.

All of these approaches will be covered in this article after a quick review

of the basic requirements for any mount regardless of its height. The first and most important is that in order for a satellite dish to track all of the satellites it must be mounted on a pole that is absolutely plumb or perpendicular to the earth. No adjustment of any kind can compensate for a pole mounted dish that is not plumb. The mount must also be rock steady in order to keep the dish aimed precisely at a satellite. A satellite dish "sees" or is focused on a very small piece of the sky and an aiming error of a fraction of an inch can mean the difference between a great picture and no picture at all! Finally the mount must be substantial enough to handle the worst weather that your area will ever have. The higher a dish is off the ground, the more severe the wind loading stress is apt to be. In spite of the apparent challenge of getting your dish up off the ground, it is not as difficult as it may seem.

By the way, there is one common misconception about an elevated dish mount and that is that it will improve reception in the same way that regular local TV reception can sometimes be improved by getting the antenna up higher. The transmitting satellites are approximately 22,300 miles above us in space and because satellite reception technology depends on line of sight or seeing the satellite, getting the dish up higher improve reception only when it eliminates an obstruction to the dish.

Continued on page 74

Can't see the picture for the trees -

Innovative installations overcome mother nature's objections. (Lower photo submitted by reader Fran Popovich.)

Trees from page 73

Although some of the methods of elevating a satellite dish will be expensive, some of them are surprisingly inexpensive. In some cases the savings in labor and running cable by having the dish mounted on a pole next to the house can make up for the additional cost of a tall pole mount. The prices quoted in regard to the various methods are estimates and can vary greatly, either more or less, depending on the specific material and labor requirements of your particular site. I will also caution you that while it makes sense to get more than one quote on the cost of an elevated mount, make SURE that you are comparing apples to apples in regard to not only the quality and design of the mount but also the competence and experience of the dealer or installation company. While a properly installed elevated mount can be very safe and reliable, a poorly designed or installed one can be a disaster in terms of structural damage to your home or property, not to mention the possible serious injury or death of someone involved in the structural failure of an elevated mount.

Site Survey

A professional site survey should be done on your property before a dish is installed on any kind of mount. This is to insure that wherever the dish is mounted, it will get a clear view of all the satellites. A professional site survey should also include a check for microwave interference which can come from telephone microwave relay towers or airport radar and interfere with or wipe out some of your satellite channels. (See article "Fighting Terrestrial Interference", Home Satellite TV, Jan. 1986) This is even more important for non-ground mounted dishes because in areas affected by terrestrial interference, the level or amount of interference usually increases as you get higher off the ground. Therefore the check for terrestrial interference should be done at the exact point where the dish is to be mounted, not on the ground.

TALL POLE MOUNTS

A tall pole will have a greater tendency to sway than a short pole and, because of this, the pole must either be stiffened or secured near the top.

Building—Secured Tall Pole Mount

The easiest way to secure a tall pole near its top is to attach it to the side of

a structure such as a building, house or garage. This can be done by using a bracket as shown. Make sure that the pole is tall enough for the dish to clear the roof as it swings through the polar arc of satellites. The ground end of the pole for this type of mount is usually set in concrete or welded to a plate that is bolted to a concrete slab or other surface.

There are some aspects of this type of installation that should be given careful attention.

1) It is very important that a bracket of this type is securely bolted into the house. Make sure that the bolts extend into a solid piece of a roof member rather than an exterior piece of non-structural trim. The section of



Pole Mount - One way to get above trees.

roof should be structurally strong enough to provide proper reinforcement for the pole. This type of mount usually produces much less of a structural demand on a house or building than a roof mount.

2) The pole should be placed through the bracket and set in the ground hole. The pole **MUST BE PLUMB AT THE TOP**. The easiest way to accomplish this is to have someone move the pole around in the foundation hole while someone else stands at the top of the pole and checks the pole with a level. The pole should be carefully checked to insure that it is plumb by moving the level around the pole and giving pole-moving directions to the person on the ground.

3) Once the pole is plumb, the concrete can be poured in the hole to secure the pole.

Freestanding Pole Mount

If the dish is to be installed out in the open away from a structure, it can be reinforced with a column of concrete. First the pole is set in concrete as described previously. Then a sono tube (a heavy cardboard tube used as a disposable concrete form) is cut a few feet shorter than the length of the pole extending out of the ground and is placed over the pole and filled with concrete. A sono tube can be purchased from a building supply company.

ROOF MOUNTED DISH

Roof mounted dishes, although practical, require the most careful consideration of all the dish mounting options. The reason for this is that your house becomes the foundation for the dish and must therefore be structurally sturdy enough to support it under the worst conditions that might occur in your area. It is very important that you consult a structural engineer and have him inspect your house and review the specifications of the mount so that he can determine if your house can support the mount. The engineer will also be able to tell you whether or not any additional structural reinforcement is necessary and if so will be able to furnish you with drawing and specifications for the required reinforcement.

Pictured in the drawing is an example of the type of structural roof reinforcement that is sometimes necessary in order to provide a reliable foundation for a roof mount. This type of reinforcing spreads the load of the dish and the mount over a greater area of the roof structure.

There are a variety of roof mounts available to conform to different types of roof lines and pitches. The two most popular configurations are the tripod type with an adjustable rear leg which allows it to adapt to various roof pitches including flat roofs.

Another popular configuration is the saw horse type mount which straddles the peak of the roof. This type is used to get the dish up to the highest point of a roof, when necessary to clear obstructions.

I suggest that you purchase a roof mount specifically designed for the type of installation you are doing, such as those offered by the ROHN company. They offer a complete line of roof mounts and towers and can provide technical specifications for their mounts that will enable an engineer to help you select a mount that is right



Big lift - Crane places dish over trees.

for you. These drawings will also help the engineer draw specific plans to incorporate the mount in any roof reinforcement that is necessary.

TOWER MOUNTED DISHES

Mounting your dish on a tower is the final option when it is necessary to get a dish higher off the ground than roof level. Properly installed and erected, towers are very sturdy, reliable and safe. However, it is absolutely essential that this type of work be done by a qualified dealer with experience installing mounted dishes.

It is your responsibility to insure that the tower complies with local building codes and local zoning ordinances. While this is usually less of a problem in rural areas, it is in your own best interest to insure that any structure erected on your property is safe. If you receive a denial from the zoning office, don't take a simple no for an answer. Ask to see the specific ordinance that prohibits the exact installation that you plan. I have personally challenged a local government denial of a permit only to find that since the official wasn't sure, he simply said no. Believe it or not, his reaction was they must not be allowed, since there was no mention of satellite dishes in the local ordinances. If you think that you have been unfairly denied a permit for installation of a satellite dish, ask your dealer to contact S.P.A.C.E. (Society for Private and Commercial Earth Stations) for help or you can contact

them directly at 300 North Washington Street, Suite 310, Alexandria, Virginia, 22314. Along with booklets and information on a variety of issues related to satellite TV, S.P.A.C.E. continues to work hard in Washington to insure that the needs of satellite TV system owners are addressed by our government. Membership in the organization is free for individual dish owners.

Towers are not freestanding, which means that they must be reinforced by either connecting them to the side of a building or securing them with guy wires. Therefore, if the tower is guyed (supported with guy wires), then your property must be large enough to contain the wires that will reach out from the tower. Towers should always be erected well away from power lines because of the danger of electrocution. Some power lines can look like telephone wire so it pays to be very careful.

For towers that are significantly higher than rooflines, a crane is usually brought in to place the dish on top of the tower.

It is very important that you check out a dealer before you have one install any tall mount. As you can see, elevated mounts require greater knowledge, experience and expertise on the part of

the installer than do standard ground pole mounts. I suggest that you ask for references of other customers for whom your prospective dealer has installed a tall or roof mounted dish.

It also is a good idea to make SURE that the dealer has liability insurance so that he will be able to take care of any damage to your property or someone else's in the event of an unforeseen problem.

You should also report your new satellite TV system to your homeowner's insurance company to ensure that it is covered.

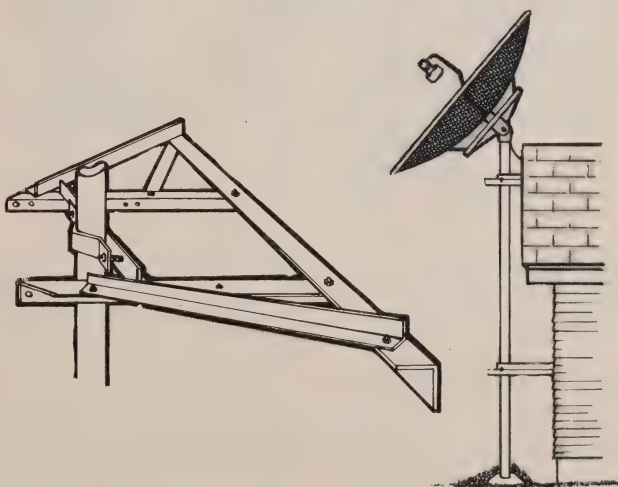
TECHNICAL TIP

A tower mounted dish sometimes requires a long cable run from the dish to the receiver and in some cases a line amplifier will be necessary.

I wish to thank The Rohn Company for their contribution of materials for this article. They offer a complete line of high quality towers, roof mounts and ground mounts for satellite TV, HAM radio and CB antennas. They can be reached at 309-657-4400 or write them at 6718 West Plank Road, P.O. Box 2000, Peoria, Illinois, 61656.

This article is an excerpt from a new book soon to be released called "Understanding Satellite TV" by Tim Harrington. ▴

Drawing Courtesy of the Rohn Company



Rohn Pole Mount - This is an inexpensive alternative to elaborate ground or yard mounts. The galvanized metal can be assembled in three steps and is designed for building sides. It supports most dishes.



SO THIS IS SCRAMBLING?

It's More A Comedy Than A Melodrama



Well, they did it; at midnight on January 15th, HBO and Cinemax, using a total of four satellite channels or transponders, threw their scrambling switches on. Surprise. The skies did not go dark, as we had been warned. I checked my satellite terminal at 12:01 and then every few hours thereafter expecting the worse. Had we not been warned, told repeatedly by various HBO executives that our satellite terminals would "go dark," our grapefruit would grow

an ugly shade of green hair and our children would become sterile? I also checked my grapefruit. The kids I allowed to sleep. I did ask my sixteen-year-old son the next morning if he felt OK. He did.

HBO, for the record, had promised us that they would begin fulltime scrambling on January 15th. They also promised us that before they began this new trick, there would be *plenty* of descramblers in distributor and dealer hands to take care of anyone

who really wanted to continue watching (and now paying for) their services. Very clever these HBO people. "We thought" they meant tens of thousands of distributors for M/A-Com on the 15th and found fewer than 300 descramblers had been shipped to them, *in total*. Just when I thought HBO lied to us (yes, that is a nasty thought and I am apt to be struck by lightning for having such a thought), I figured out what they really meant by "plenty of descramblers available for anyone who wanted one".

HBO obviously knew their market. They apparently knew that 300 of those M/A-Com units spread nationwide was more than enough to handle the pent up demand. We were snookered again.

I really enjoy playing with my M/A-Com built VC2000E/B unit. It is a fun little technological toy. Here's how it works.

FIRST, you unpack the attractive cardboard box and lift the VC2000 unit out of the container. There is a small booklet that warns you of several things; important things. Such as "Don't operate this unit outside of the United States". That's a good bit of advice. I know that inside there is a tiny plastic explosive charge which will blow up the unit if it figures out with its internal logic that it is on the island of Jamaica, or across the Detroit River in Canada.

Another bit of advice tells you "This unit is not intended for use in a wet environment". I liked that one. I really planned to give it a treat and invite it to take a shower with me once a week. I figured it would need a good scrubbing after processing all of those filthy HBO movies. Now that I have been warned, I'll simply send it out for dry cleaning.

Still another instruction told me not to try to use the unit to decode HBO for a motel, hotel or apartment building. That's another bit of valuable instruction since connecting more than one television set to it will apparently blow out its fuse or some other nasty electronic gadget. I know of several people who planned to install their HBO descrambler in their shower stall

located on an offshore oil rig in Bahamian waters. I'll have to warn them they are risking triple jeopardy.

There were a few things which I discovered about my VC2000 descrambler however which were not covered in the instruction manual. Yes, even though they told me a great deal, they did miss a few important points. For example:

1) They didn't tell me that it would descramble both HBO and Cinemax, east coast and west coast feeds. *I said I wanted HBO only;* I did not want Cinemax. That threw them for a loop when I insisted on the telephone I did not wish Cinemax. "We won't charge you for it" they said. I was grateful they were so understanding. It turned out all right; afterwards I found out I really wanted Cinemax after all but I didn't want HBO.

2) They didn't tell me it would decode the SHOWTIME scrambling tests. That's another plus; maybe when SHOWTIME goes to full time scrambling in May I can just keep on ordering HBO, watching only Cinemax and get SHOWTIME (which I think I will want) free.

3) They also didn't tell me that those new pay-per-view movie features on RCA's F3R satellite, transponder 5, would also unscramble with my VC2000. Their movies don't rotate very often, but they are much newer movies than one finds on the other services. *And they are free.* What a nice bonus from HBO, throwing in the Showtime operated pay per view movies at no charge. Gosh, maybe these HBO people are not as bad as people have been saying!

Those were certainly extra benefits I got with my VC2000 unit. Unfortunately, the instruction manual also missed a few not so pleasant surprises as well.

1) No place in the manual did they tell me that there are actually two versions of the VC2000. There is a VC2000E and a VC2000 E/B. Mine was the E/B. Naturally I wondered what the difference might be.

2) It turned out that the E/B version, the only version that was available for shipment at first, only works with certain brands and models of

TVRO receivers. DX models, M/A-Com models were amongst those that did work with the E/B units. Uniden, Drake and many others including the Chaparral Sierra would only work with the E version.

3) I was lucky; I hooked my first VC2000 up to a DX receiver and it worked within seconds of my calling the 800 toll free number provided with the unit and reporting my serial number and giving them my VISA card number. I discovered the problem only when I tried to use it with some other non-DX receivers I had on hand.

Apparently nobody else knew this fact either. I called a few of the distributors who were handling the unit. They were as baffled as I. It took several more telephone calls to HBO and M/A-Com to ferret out the truth. I'm reasonably sure that by the time you read this it will straighten itself out. But right now, late in January, the whole situation is hopelessly confused. Neither HBO nor M/a-Com will talk "on the record" about this problem. But hey, that's all right. You guys can simply owe us one.

Maybe on further thought HBO owes us more than one. I have in front of me an advertisement prepared and paid for by HBO. That advertisement has been running in various TVRO program guide publications. It clearly states that if I purchase my VC2000 descrambler before January 15th, I will not miss any HBO programs and that I will get "free HBO service" until January 15th. I am further advised to contact my local M/A-Com dealer or distributor or my local cable system to learn where I can obtain my descrambler. I tried that. The cable firm, the M/A-Com dealer and the M/A-Com distributors all pleaded ignorance. They didn't have descramblers, didn't know who would have them, or when they would be available. But not to worry, I estimate we had 300 or so available on January 15th nationwide and as it probably turned out, that was a good 200 or so more than we really needed anyhow.

I was also amused by another development in the scrambling pricing arena. Just days before January 15th,

I received a post card promotional mailer from a TVRO distributor in South Carolina. It told me that it was foolish to pay \$19.95 a month for both HBO and Cinemax because *they* could put me in touch with a cable operator who would sell it to me wholesale; for \$12.95 per month. I liked that concept; a little cable operator in some small town in Iowa had decided to "go national" and offer the service to any home viewer for a reduced rate. I tried to get the reaction of HBO to this latest development. They couldn't find anyone to talk with me about it. So I dug back into some HBO promotional literature and sure enough there it was; they were quite succinct in stating that if a cable operator wanted to sell their services in non-cable franchised areas, he could do so. This guy simply had a broader (national) view than most.

By accident of course, HBO was meeting that price by offering to throw in Cinemax free with HBO for now simply because their M/A-Com system at the uplink was not capable of selectively giving me HBO while keeping Cinemax dark on my screen. Alas, I knew that would not last. Let's see now, if cable operators can buy HBO and Cinemax for less than \$4 each at the wholesale rate, how low might the pricing ultimately go with little cable operators "going national" in the marketplace? I'd stick my neck out and predict a rate of \$9.95 before it all settled out. Isn't that good? Isn't high, unreasonable price one of the primary concerns now threatening continued TVRO growth?

I can see programmer reaction to discount pricing.

"Joe, how are things in Left Over-shoe, Iowa this morning?"

The little cable operator has never had a telephone call directly from a vice president of ICP before. He is overwhelmed.

"Look Joe, there seems to be some confusion about what we are all charging these home dish people for their ICP service. As you know, we have announced a suggested rate of \$12.95 per month. But I see here where you are charging \$5.95."

The LCO (little cable operator)

Continued on page 78

Descrambler Compatible

Ever since M/A-Com introduced the VideoCipher II descrambler late last year, manufacturers have been submitting receivers to determine if they were compatible. Among the latest of these is the Houston Tracker System V.

According to a M/A-Com report, several dozen receivers are compatible through the receiver's 70 Mhz IF loop. Approval means that the Tracker System V Receiver interfaces directly with the M/A-Com VideoCipher II Model 2000E descrambler.

Houston Tracker recommends *only* the Model 2000E descrambler for ease of installation and full system compatibility. (The model 2000E-B is not recommended for use with the System V.) For more information on the Houston Tracker product, call (713) 784-8953.

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Scrambling

Continued from page 77

admits he is discounting the ICP rate but defends himself with "So what? Isn't that the great American way, to bring some competition to the marketplace?"

"Joe, how do you think it looks to the boys upstairs when your little cable system has 240 subscribers paying for ICP one month and 2,400 the next month and 24,000 the month after that? Joe, some of the BTOs (big time operators are concerned that you can't handle that volume of business growth and you may be getting yourself in trouble. We love you Joe, like we love all of our LCO affiliates. We don't want to see anything nasty happening to you."

The LCO responds that he just bought himself an Apple 2E computer to keep records, he has his own 800 number now and the Left Overshoe Chamber of Commerce is giving him the "Man of the Year Award" for doing so much to put Left Overshoe on the map nationwide.

"Joe, I'm happy for you and your success. But this is a very competitive business world and we've decided that we don't need an affiliate in Left Overshoe anymore. So this is the last month we will be providing you service from the satellite. Sorry Joe."

I suspect that the cable programmers will "find ways" to deal with those LCOs who "get out of line" with their pricing. The cable programmers have a too-good-thing going here to let some LCO in Left Overshoe come along and screw it up with "competition".

So the great scrambling debacle of 1986 is finally here. HBO had promised us plenty of descramblers available before they would start full time scrambling and M/A-Com kept insisting right up to January 15th they could turn out thousands of these funny little boxes per day, hour or minute; depending upon the hype you wanted to believe. But nobody thought to ask HBO or M/A-Com *which* version of descrambler this might be or "which day, hour or minute" so here we start off with only one version available and by some strange quirk of fate that one version only happens to work with a handful of receivers (including, by another strange quirk of fate, the M/A-Com TVRO receivers).

Hey, that's the great American way; right! ▲

The Law from page 8

tion why a four-foot dish is inadequate and why a ten-foot dish is necessary in this neck of the great plains. The time was insufficient; we met again fourteen days later for a two-hour debate that ended with a 5-1 vote in favor of recommending my application to the Board of Trustees. I was told that my application would be considered by the Board of Trustees on the 9th of January. On the ninth, I learned that my application was in fact denied on a 5-1 vote at the regular trustees' meeting on January 6. Surprise! Frustration. Expletives deleted. I had not been notified of this change of plans and now state law prevents me from resubmitting my application for a period of six months.

When I contacted the Planning Commission to determine why my application had received such treatment. I was advised that the ordinance would be reviewed for possible amendment because the Planning Commission and Board of Trustees were not in agreement as to its application. I was invited to submit relevant materials and to attend the meeting. I quickly delivered a copy of the FCC Notice of Proposed Rulemaking, FCC press announcement, SPACE press release, a model ordinance and other materials.

After reviewing the law, the technical materials and a survey of local dealers, the commission decided to delete the requirement of screening or hiding the dish, an absolute necessity in the previous meetings. The commission increased the diameter of permitted dishes from four feet to ten feet while requiring that any dish greater than six feet in diameter be of a perforated or mesh construction for aesthetic reasons. All dishes are to be installed in the rear yard, ground mounted with maximum height of twelve feet above grade and maximum diameter of twelve feet for residential installations. Dishes between ten and twelve feet in diameter require a special use permit.

Other changes may be made before the trustees vote on the amendment, but this is a start and an improvement over the prior situation. It may be an indication of what the preemption may mean for you and how it can be used to ameliorate the inconvenience of your existing ordinance. If your town is presently considering an ordinance, make certain that the governing body is aware of the FCC action and its effect. FCC materials may be obtained from: FCC, 1919 M Street, Washington, D.C. 20554 (202) 254-7674. ▲



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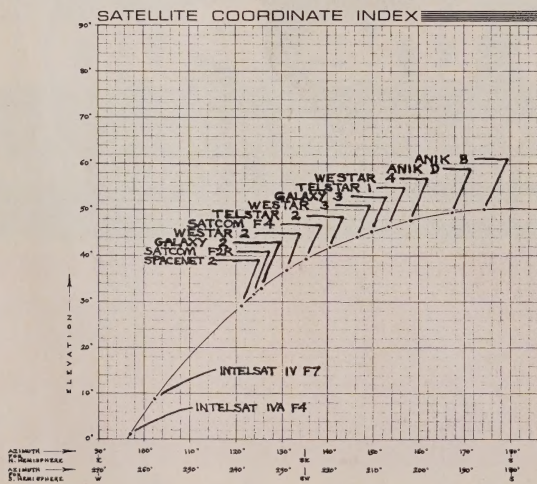
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TROUBLE

Continued from page 60

less you want to take the drive off and unscrew it, there is nothing to do but call for help. If you do take it off, unscrew it a few turns and try running it again. If nothing happens then the trouble is either in the jack or you are not getting any power to the motor.

Check the wires to the jack. Wiggle them. Nothing going on? Are any loose? Again, if you are somewhat of an adventurous person there is another step you can take. Make sure the controller is unplugged before proceeding. Unscrew the back plate and check the terminal for loose wires. The biggest wires will be the motor wires and the smaller ones are the sensor wires. If one of the motor wires is loose the jack will only move one way. Consult the manual to re-hook any loose wires. Better safe than sorry.

Another problem that happens quite often is that the dish is blown off of true north-south. Of course, if you have a hole drilled through the pole and a bolt through it, that won't happen. And if it does, I'm glad I wasn't around. If you don't have a bolt through it, then make a mark on the collar of the mount and on the pole for a reference.

Other frequent and not so frequent phenomena that interrupt us from getting our MTV or CNN or WTBS are: poles that move out of plumb, pads that frost heavily, cable lines cut, the house's electrical system out of sync, your dish is full of snow, the feed or LNA is full of water, it's a solstice, the accordion-type actuator cover gets sucked up inside the drive and jams, the focal point has changed or it could be a...wait a minute. I guess I'm kind of wandering away from the main point, and at a rather rapid rate, I might add.

Those things do transpire. Much of the gist of this was to give you a place to start if you do encounter a "downed system," as they might say in the business. It could very well save you some time and money to isolate the problem before bringing in the calvary. It will save you a service charge to be able to take the bad component to the dealer. If it is something you can't fix, being able to tell the dealer the problem at hand will save his time and your money. Do this with care because if you act too smart about all this, he may want to hire you and that means going out to someone else's place because they haven't read this article or they forgot to plug in the receiver or they have a wasp's nest in the feed or....

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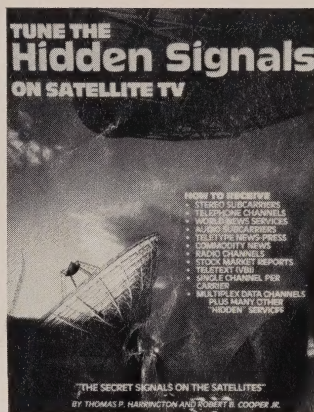
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